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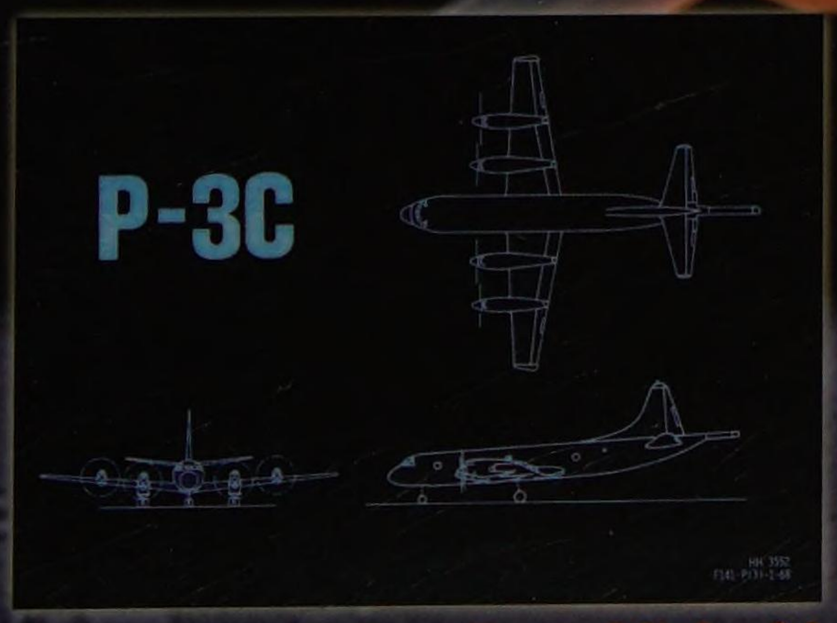

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Pilot's Flight Operating Instructions

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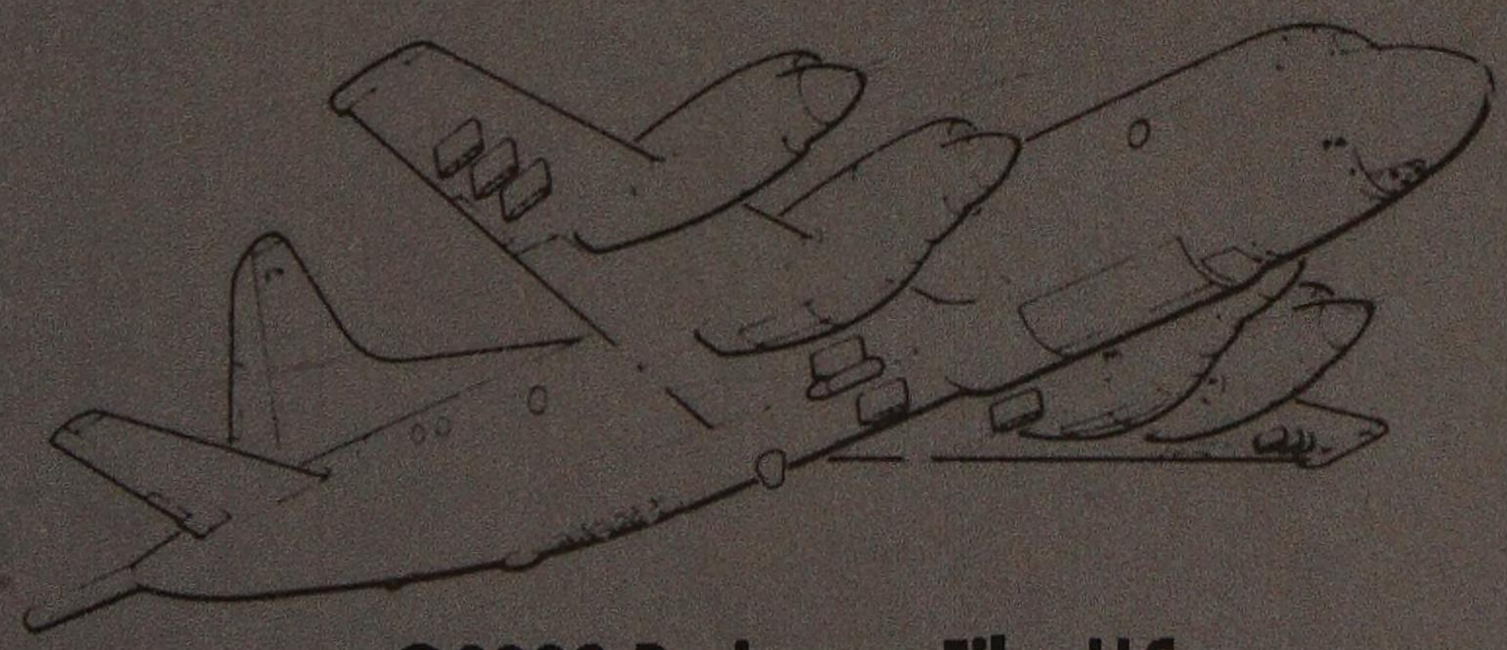

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15 DECEMBER 1981

NAVAIR 01-75PAC-1.1

NFO/AIRCREW
NATOPS FLIGHT MANUAL

NAVY MODEL

P-3C AIRCRAFT

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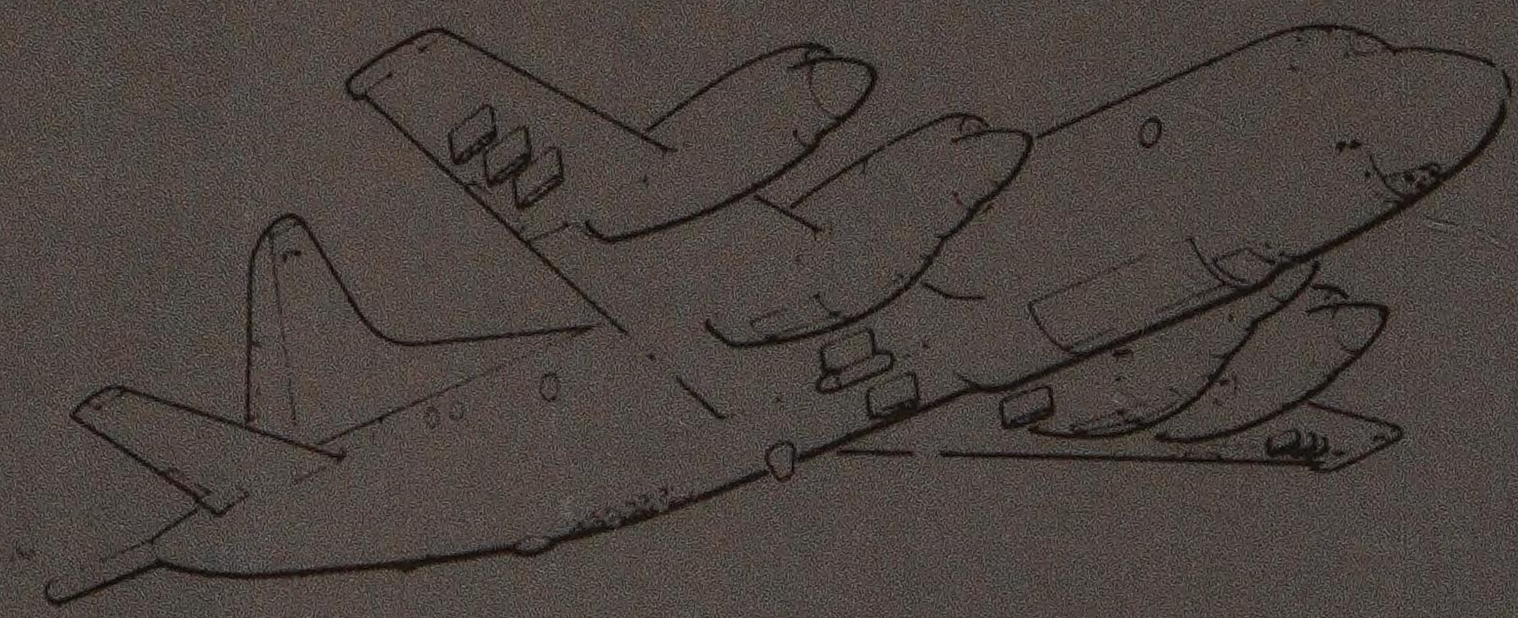

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INTERIM CHANGE SUMMARY

The following Interim Changes have been canceled or previously incorporated in this manual:

INTERIM CHANGE NUMBER(S)	REMARKS/PURPOSE
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The following Interim Changes have been incorporated in this Change/Revision:

INTERIM CHANGE NUMBER	REMARKS/PURPOSE
32	Ditching Procedures
33	Master Arm Power Warning

Interim Changes outstanding—to be maintained by custodian of this manual:

INTERIM CHANGE NUMBER	ORIGINATOR/DATE (or DATE/TIME GROUP)	PAGES AFFECTED	REMARKS/PURPOSE

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DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

15 December 1981

LETTER OF PROMULGATION

1. The Naval Air Training and Operating Procedures Standardization (NATOPS) program is a positive approach toward improving combat readiness and achieving a substantial reduction in the aircraft accident rate. Standardization, based on professional knowledge and experience, provides the basis for development of an efficient and sound operational procedure. The standardization program is not planned to stifle individual initiative, but rather to aid the Commanding Officer in increasing his unit's combat potential without reducing his command prestige or responsibility.

2. This manual standardizes ground and flight procedures but does not include tactical doctrine. Compliance with the stipulated manual procedure is mandatory except as authorized herein. In order to remain effective, NATOPS must be dynamic and stimulate rather than suppress individual thinking. Since aviation is a continuing, progressive profession, it is both desirable and necessary that new ideas and new techniques be expeditiously evaluated and incorporated if proven to be sound. To this end, Commanding Officers of aviation units are authorized to modify procedures contained herein, in accordance with the waiver provisions established by OPNAVINST 3510.9 series, for the purpose of assessing new ideas prior to initiating recommendations for permanent changes. This manual is prepared and kept current by the users in order to achieve maximum readiness and safety in the most efficient and economical manner. Should conflict exist between the training and operating procedures found in this manual and those found in other publications, this manual will govern.

3. Checklists and other pertinent extracts from this publication necessary to normal operations and training should be made and may be carried in Naval Aircraft for use therein. It is forbidden to make copies of this entire publication or major portions thereof without specific authority of the Chief of Naval Operations.

W. L. McDONALD
Vice Admiral, USN
Deputy Chief of Naval Operations
(Air Warfare)

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Note

- **List of Illustrations—Titles Included in Alphabetical Index.**
- ***This manual is incomplete without the following publications:***

  NATOPS Flight Manual (NAVAIR 01-75PAC-1)
  NATOPS Supplemental Flight Manual (NAVAIR 01-75PAC-1A)

FOREWORD

SCOPE

The NATOPS Flight Manual is issued by the authority of the Chief of Naval Operations and under the direction of Commander, Naval Air Systems Command in conjunction with the Naval Air Training and Operating Procedures Standardization (NATOPS) Program. This manual contains information on all aircraft systems, performance data, and operating procedures required for safe and effective operations. However, it is not a substitute for sound judgment. Compound emergencies, available facilities, adverse weather or terrain, or considerations affecting the lives and property of others may require modification of the procedures contained herein. Read this manual from cover to cover. It's your responsibility to have a complete knowledge of its contents.

APPLICABLE PUBLICATIONS

The following applicable publications complement this manual:

NAVAIR 01-75PAC-1 (Flight Manual)
NAVAIR 01-75PAC-1A (Confidential Supplement)
NAVAIR 01-75PAC-1C (Checklist)
NAVAIR 01-75PAC-1F (Functional Checkflight Checklist)
NAVAIR 01-75PAC-11-1 (Series) (P-3C System Operator Manual)
NAVAIR 01-75PAC-11-2 (Series) (P-3C Update System Operator Manual)
NAVAIR 01-75PAC-12 (Series) (Crew Station Maintenance Manual)

HOW TO GET COPIES

Each flight crewmember is entitled to personal copies of the NATOPS Flight Manual and appropriate applicable publications.

Automatic Distribution

To receive future changes and revisions to this manual or any other NAVAIR aeronautical publication automatically, a unit must be established on an automatic distribution list maintained by the Naval Air Technical Services Facility (NATSF). To become established on the list or to change existing NAVAIR publication requirements, a unit must submit the appropriate tables from NAVAIR 00-25DRT-1 (Naval Aeronautic Publications Automatic Distribution Requirement Tables) to NATSF, Code 321, 700 Robbins Avenue, Philadelphia, PA 19111. Publication requirements should be reviewed periodically and each time requirements change, a new NAVAIR 00-25DRT-1 should be submitted. NAVAIR 00-25DRT-1 only provides for future issues of basic, changes, or revisions and will not generate supply action for the issuance of publications from stock. For additional instructions, refer to NAVAIRINST 5605.4 series and Introduction to Navy Stocklist of Publications and Forms NAVSUP Publication 2002 (S/N 0535-LP-004-0001).

Additional Copies

Additional copies of this manual and changes thereto may be procured by submitting DD Form 1348 to NAVPUBFORMCEN Philadelphia in accordance with Introduction to Navy Stocklist of Publications and Forms NAVSUP Publication 2002.

UPDATING THE MANUAL

To ensure that the manual contains the latest procedures and information, NATOPS review conferences are held in accordance with OPNAVINST 3510.9 series.

CHANGE RECOMMENDATIONS

Recommended changes to this manual or other NATOPS publications may be submitted by anyone in accordance with OPNAVINST 3510.9 series.

Routine change recommendations are submitted directly to the Model Manager on OPNAV Form 3500-22 shown on the next page. The address of the Model Manager of this aircraft is:

Commanding Officer
Patron 31 Attention: P-3 Evaluator
NAS Moffett Field, California 94035

Change recommendations of an URGENT nature (safety of flight, etc.,) should be submitted directly to the NATOPS Advisory Group Member in the chain of command by priority message.

YOUR RESPONSIBILITY

NATOPS Flight Manuals are kept current through an active manual change program. Any corrections, additions, or constructive suggestions for improvement of its content

NATOPS/TACTICAL CHANGE RECOMMENDATION
OPNAV FORM 3500/22 (5-69) 0107-722-2002

DATE

TO BE FILLED IN BY ORIGINATOR AND FORWARDED TO MODEL MANAGER

FROM (originator)	Unit
TO (Model Manager)	Unit

Complete Name of Manual/Checklist	Revision Date	Change Date	Section/Chapter	Page	Paragraph

Recommendation (be specific)

☐ CHECK IF CONTINUED ON BACK

Justification

Signature	Rank	Title

Address of Unit or Command

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FROM	DATE

TO

REFERENCE

(a) Your Change Recommendation Dated _____

☐ Your change recommendation dated _____ is acknowledged. It will be held for action of the review conference planned for _____ to be held at _____

☐ Your change recommendation is reclassified URGENT and forwarded for approval to _____ by my DTG _____.

/S/ _____ MODEL MANAGER. | _____ AIRCRAFT

should be submitted by routine or urgent change recommendation, as appropriate, at once.

NATOPS FLIGHT MANUAL INTERIM CHANGES

Flight Manual Interim Changes are changes or corrections to the NATOPS Flight Manuals promulgated by CNO or NAVAIRSYSCOM. Interim Changes are issued either as printed pages, or as a naval message. The Interim Change Summary page is provided as a record of all interim changes. Upon receipt of a change or revision, the custodian of the manual should check the updated Interim Change Summary to ascertain that all outstanding interim changes have been either incorporated or canceled; those not incorporated shall be recorded as outstanding in the section provided.

CHANGE SYMBOLS

Revised text is indicated by a black vertical line in either margin of the page, adjacent to the affected text, like the one printed next to this paragraph. The change symbol identifies the addition of either new information, a changed procedure, the correction of an error, or a rephrasing of the previous material. Changes to illustrations are indicated by miniature pointing hands.

WARNINGS, CAUTIONS, AND NOTES

The following definitions apply to WARNINGS, CAUTIONS, and NOTES found through the manual.

WARNING

An operating procedure, practice, or condition, etc., which may result in injury or death, if not carefully observed or followed.

CAUTION

An operating procedure, practice, or condition, etc., which, if not strictly observed, may damage equipment.

Note

An operating procedure, practice, or condition, etc., which is essential to emphasize.

WORDING

The concept of word usage and intended meaning which has been adhered to in preparing this Manual is as follows:

Shall has been used only when application of a procedure is mandatory.

Should has been used only when application of a procedure is recommended.

May and *need not* have been used only when application of a procedure is optional.

Will has been used only to indicate futurity, never to indicate any degree of requirement for application of a procedure.

GLOSSARY

ABBREVIATIONS AND ACRONYMS

ABBREVIATION OR ACRONYM	DEFINITION
A	BFI Trace or CIP A
A/A	Air-to-Air
A/C	Aircraft
AAI	Air-to-Air Interrogator
ACC	Accuracy Check Control
ACCPD	Accepted
ACK	Acknowledge
ACTVT	Activate
ADL	Auxiliary Display Logic
AFC	Airframe Change, Automatic Frequency Control
AFCS	Automatic Flight Control System
AGM	Air-to-Ground Missile
ALI	Automatic Line Integration
ALI BRG	Automatic Line Integrated Bearing
Alpha Range	Propeller Flight Operating Range
AMAC	Aircraft Monitor and Control System
AMPFY	Amplify
AOA	Angle-of-Attack
APU	Auxiliary Power Unit
ARM	Armament
ARO	Auxiliary Readout Display
ASCII	American Standard Code for Information Interchange
ASGN	Assign
ASRAPS	Acoustic Sensor or Range Prediction Service
ASSG	Acoustic Sensor Signal Generator
ATAC	Air Transportable Acoustic Communications
AUTO	Automatic (Tuning Mode)
B	BFI Trace B or CIP B
Beta	Propeller Blade Angle
Beta Range	Propeller Ground Operating Range
BFI	Bearing Frequency Indicator
BIT	Built-In Test (Facilities for External Test)
BITE	Built-In Test Equipment (Facilities for Self-Test)
BOL	Bearing Only Launch
BOT	Beginning of Tape
BR	Blade Rate
BT	Bathythermograph
BU	Battery Unit
C	BFI Trace C or CIP C
CAD	Cartridge Actuated Device
CAS	Calibrated Airspeed
CASS	Command Active Sonobuoy System
CAVITN	Cavitation
CCW	Counterclockwise
CDG	Control Display Generator
CDI	Course Deviation Indicator
CDU	Control Display Unit
CF	Confidence Factor
CFT	Computer Frequency Tracker
CG	Center of Gravity
CIP	Control Indicator Panel
CIU	Communications Interface Unit
CLRD	Cleared
CMPUT	Compute
CNT	Contact
COM	Communicator, Communication
COMP LOFAR	Comparative LOFAR
COMP OVRD	Computer Override (Tuning Mode)
CON	Control
CONT PRDCT	Continuous Predict
CPA	Closest Point of Approach
CPI	Crash Position Indicator
CRT	Cathode Ray Tube
CTGRY	Category
CURSR	Cursor
CW	Clockwise or Continuous Wave
CWS	Control Wheel Steering
CYLR	Cylinder Rate
D	BFI Trace D or CIP D
DA	Drift Angle
DCI	Display Control Indicator
DDU	Digital Data Unit
DECR	Decrease
DELTIC	Delay Line Time Compressor
DEMON	Demodulation LOFAR
DESIG	Designate
DF	Direction Finder
DG	Directional Gyro
DIFAR	Directional Frequency Analysis and Recording
DIM	Digital Input Multiplexer
DIS	Displays
DISCR FREQ	Discrete Frequency
DIU	DIFAR Interface Unit
DL	Directional Listening
DLRP	Data Link Reference Point
DLBRG	Directional Listening Bearing
DMTC	Digital Magnetic Tape Control
DMTS	Digital Magnetic Tape System
DMTU	Digital Magnetic Tape Unit
DNCU	Data Net Control Unit
DOM	Digital Output Multiplexer
DOP	Doppler
DP	Data Processor
DPC	Data Processor Computer

GLOSSARY (CONT)

ABBREVIATION OR ACRONYM	DEFINITION
DPS	Data Processing System
DRP	Data Retrieval Program
DSTY	Destroy
DTS	Data Terminal Set
DTUNE	Detune
DVARS	Doppler Velocity Altimeter Radar Set
EAS	Equivalent Airspeed
ECM	(See ESM)
ECP	Engineering Change Proposal
EDC	Engine Driven Compressor
EFB	Earth Field Balance
EMCON	Emission Control
EMERG	Emergency
EOM	End-of-Message
EOT	End-of-Tape
ESM	Electronic Support Measures
ETA	Estimated Time of Arrival
ETE	Estimated Time Enroute
ETP	Equal Time Point
EVAL	Evaluation
EXPND	Expand
EXTD	Extend
EXTRN	Extraction
EXTRT	Extract
FAT	Free Air Temperature (ambient)
FDI	Flight Director Indicator
FDS	Flight Director System
FDSC	Flight Director System Computer
FFAR	Folded-Fin Aerial Rocket
Flight Station	Flight Crew (Pilot) Compartment
FO	Foldout
FOM	Figure of Merit
FREQ	Frequency
FTP	Fly-to-Point
FUND FREQ	Fundamental Frequency
GCA	Ground Controlled Approach
GCR	Generator Control Relay
GEO	Geographic
GOB	Ground Operating Bus
GS	Glideslope, Groundspeed
GTC	Gas Turbine Compressor
HACLCS	Harpoon Aircraft Command-Launch Control Set
HDG	Heading
HORIZ	Horizon
HRD	High Rate of Discharge
HSI	Horizontal Situation Indicator
HSP	High Speed Printer
HYFIX	Hyperbolic Fix
Hz	Hertz (one cycle/second)

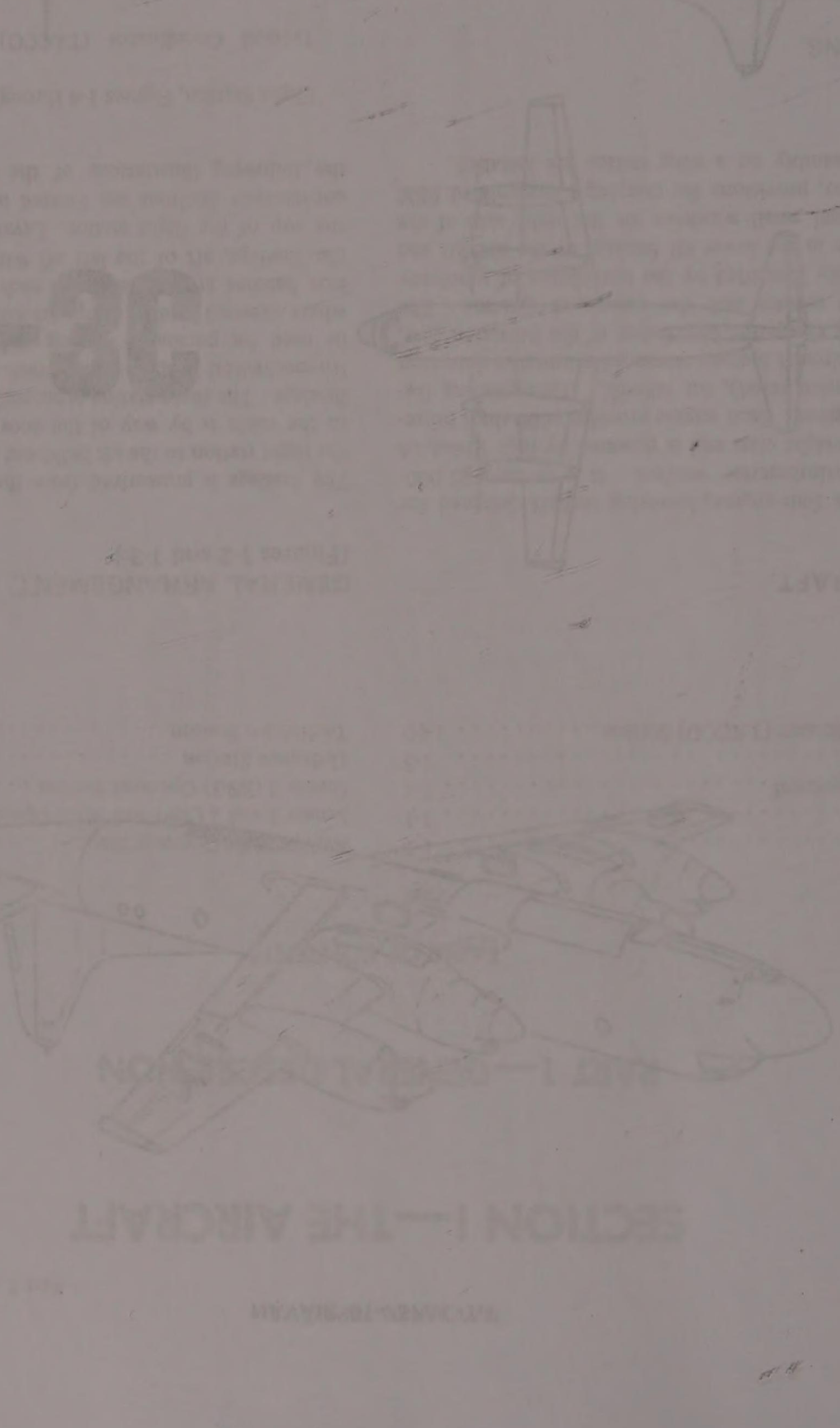
ABBREVIATION OR ACRONYM	DEFINITION
IACS	Integrated Acoustic Communication System
IAS	Indicated Airspeed
ICS	Intercommunications System
IDR	Input Data Request
IFF	Identification Friend or Foe
IFF/SIF	Identification Friend or Foe Selective Identification Feature
IFPM	In-flight Performance Monitoring
ILLEG	Illegal
ILS	Instrument Landing System
IMN	Indicated Mach Number
IMPROP	Improper
INC	Increase
INCMG	Incoming
INITLZN	Initialization
INS	Inertial Navigation System (Set)
INTCP	Intercept
INU	Inertial Navigation Unit
INV	Inventor
I/O	Input/Output
IRDS	Infrared Detection System
IRG	Inter Record Gap
ISD	Initial Search Depth
KVA	Kilo-volt Amps
KYSET	Keyset
LAT	Latitude
LBA	Limits of the Basic Aircraft without external stores
LDR	Low Data Rate
LED	Light Emitting Diode
LO or LOWER	Lower half of BFI presentation (DIFAR or RANGE mode)
LOB	Line of Bearing
LOC	Localizer
LOD	Light-Off Detector
LOFAR	Low Frequency Analysis and Recording
LON	Longitude
LOP	Line of Positions
LOS	Line of Sight
LSB	Lower Side Band
LSO	Low Speed Oscillator
MAC	Mean Aerodynamic Chord
MACH NOISE	Machinery Noise
MAD	Magnetic Anomaly Detection
MAG	Magnetic
MAN	Manual (Tuning Mode)
MCP	Maintenance Control Panel
MDD	Multipurpose Data Display (TACCO)
MDS	Minimum Discernible (or Detectable) Signal

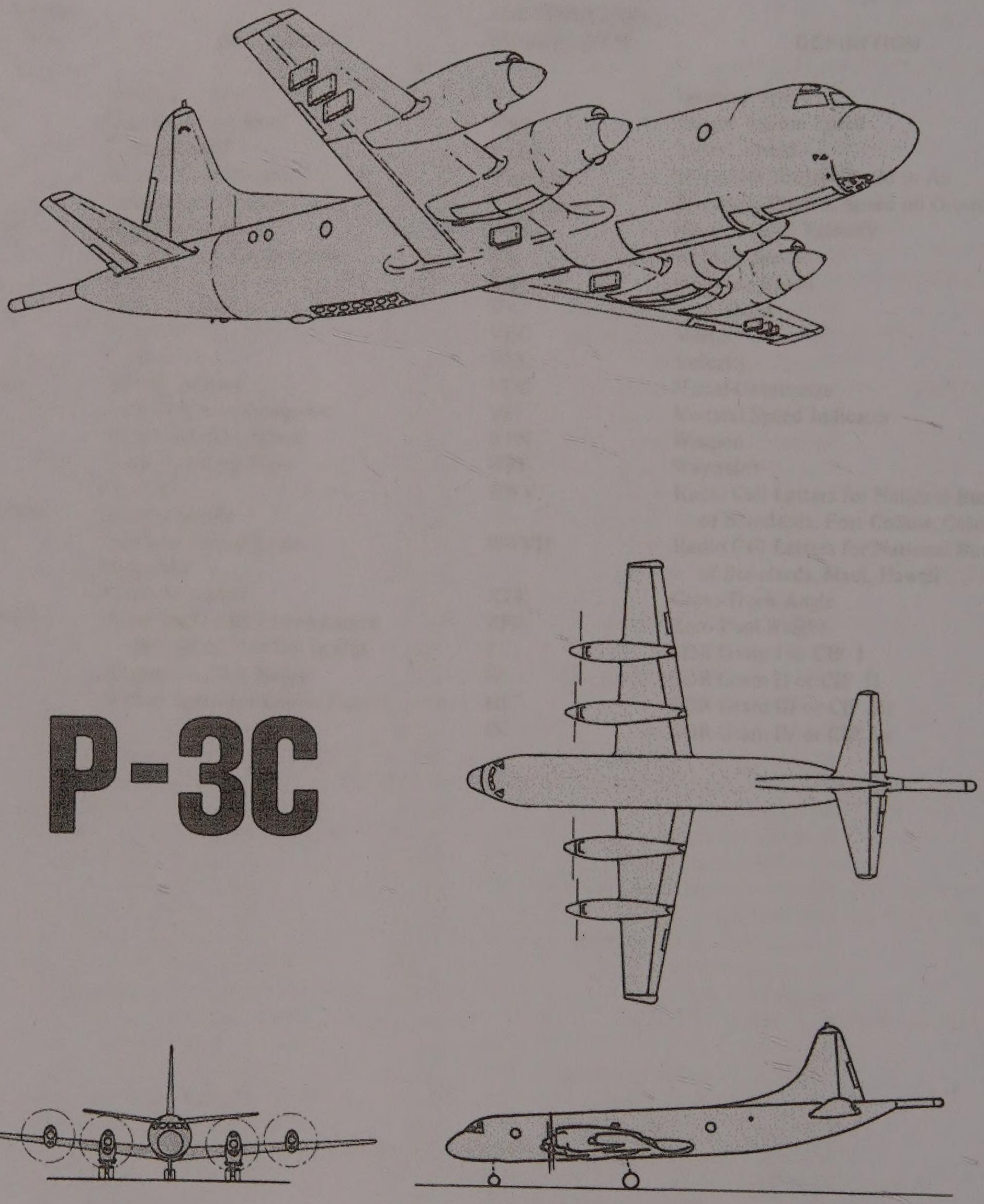
GLOSSARY (CONT)

ABBREVIATION OR ACRONYM	DEFINITION
MHRS	Magnetic Heading Reference System
MLA	Mean Line of Approach
MOT	Mark On Top
MSL	Missile
MSU	Mode Selector Unit
MTC	Magnetic Tape Control
MTT	Magnetic Tape Transport
MUF	Maximum Usable Frequency
MUSIG	Multiple Signals
NATOPS	Naval Air Training and Operating Procedures Standardization
NAV	Navigator, Navigation
NAV/COMM	Navigator/Communicator
NDB	Non-Directional Bearing
NM	Navigation Multiplexer
NTS	Negative Torque Sensing
OAT	Outside Air Temperature
OFOM	Operational Figure of Merit
OP	Operational Program
OPTNL EOM	Optional End-of-Message
ORD	Ordnance
OTPI	On-Top Position Indicator
PA	Public Address
PADC	Passive Acoustic Detection and Classification
PCM	Pulse Code Modulation
PCO	Pressure Cutout Override
PDC	Processing Display Channel
PF	Parachute Flare
PIC	Processor Input Channel
PIM	Position of Intended Movement
PLE	Prudent Limit of Endurance
PLT DIS	Pilot Display
PMBR	Practice Multiple Bomb Rack
PMG	Permanent Magnet Generator
POS	Present Position
PPC	Patrol Plane Commander
POSIT	Position
PQS	Personnel Qualification Standards
PRF	Pulse Repetition Frequency
PRR	Pulse Repetition Rate
PRO	Projection Readout
PSH	Preselect Heading
PSLT	Pressurized Sonobuoy Launch Tube
PSR	Point of Safe Return
PT	Point
PU	Participating Unit
PUTN	Participating Unit Track Number
RAWS	Radar Altimeter Warning System
R/BL	Range and Bearing Launch
RCR	Runway Condition Reading
RDR	Radar
REC	Recover
RECTR	Recenter
RECY	Recovery
REF	Reference
RF	Radio Frequency (Buoy Channel)
RIU	Radar Interface Unit
RO	Range Only
RSC	Runway Surface Covering
RSTRT	Restart
RTA	Receiver Transmitter Antenna
SAD	Sub Anomaly Detection
SAR	Search and Rescue
S/C	Scan Converter
SCR	Silicon Controlled Rectifier
S-D	Synchro-to-Digital
SDD	Sensor Data Display
SDR	Signal Data Recorder
SETAD	Secure Transmission of Acoustic Data
SF	Sonobuoy Frequency
SFC	Specific Fuel Consumption
SHP	Shaft Horsepower
SIF	Selective Indentification Feature
SINGLE PRDCT	Single Predict
SIGNAL STR	Signal Strength
SING PROP	Singing Propeller
SLC	Sonobuoy Launch Container
SLN	Straight and Level Noise
SLT	Sonobuoy Launch Tube
SM	Smoke Marker
SNR	Signal-to-Noise Ratio
SOM	System Operator Manual
SONO	Sonobuoys
SPV	Signal Processor Verifier
SPL WPN	Special Weapon
SR	Shaft Rate
SRCH	Search
SRL	Sonobuoy Receiver Logic
SRS	Sonobuoy Reference System
SS	Sensor Station
ST	Store
STAG	System Tape Generator
STAT	Status
STP	Systems Test Program
SUB	Submarine
SUS	Sound Underwater Signal
SYGNOG	System GO-NO GO
SYNC CONV	Synchronous Converter

GLOSSARY (CONT)

ABBREVIATION OR ACRONYM	DEFINITION
TAC	Tactical
TACCO	Tactical Coordinator
TAS	True Airspeed
TCG	Time Code Generator
TD	Temperature Datum
TGT POSIT	Target Position
T.I.T.	Turbine Inlet Temperature
TO	Takeoff
TKE	Track Angle Error
TRAN	Transfer
TRK	Track
TRKR BRG	Tracker Bearing
TSHP	Takeoff Shaft Horsepower
TSS	Thrust Sensitive Signal
TTS	Target Tracking Sight
TTY	Teletype
TURB WHINE	Turbine Whine
UKL	Universal Keyset Logic
UNKN	Unknown
USB	Upper Side Band
UP or UPPER	Upper Half of BFI presentation (DIFAR or RANGE mode)
V_{50}	Airspeed at 50 ft Height
V_{CR}	Critical Speed for Engine Failure
V_D	Decision Speed
V_{EF}	Engine Failure Speed
V_{LOF}	Liftoff Speed
$V_{MC\ AIR}$	Minimum Control Speed in Air
$V_{MC\ GRD}$	Minimum Control Speed on Ground
V_{NE}	Never Exceed Velocity
V_R	Refusal Speed
V_{RO}	Rotation Speed
V_S	Stall Speed
VEC	Vector
VEL	Velocity
VOR	Visual-Omnirange
VSI	Vertical Speed Indicator
WPN	Weapon
WPT	Waypoint
WWV	Radio Call Letters for National Bureau of Standards, Fort Collins, Colo.
WWVH	Radio Call Letters for National Bureau of Standards, Maui, Hawaii
XTK	Cross-Track Angle
ZFW	Zero Fuel Weight
I	SDR Gram I or CIP I
II	SDR Gram II or CIP II
III	SDR Gram III or CIP III
IV	SDR Gram IV or CIP IV





P-3C

HH 3552
F141-P(3)-1-68

Figure 1-1. P-3C

SECTION I—THE AIRCRAFT

PART 1—GENERAL DESCRIPTION

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THE AIRCRAFT.

The P-3C is a four-engine, low-wing aircraft designed for patrol and antisubmarine warfare. It is in the 135,000-pound gross weight class and is powered by four T56-A-14 turboprop engines. Each engine provides 4600 shaft horsepower (maximum rated), for takeoff. Distinguishing features of the aircraft include advanced submarine detection gear including computer interfacing of the detection gear, the ordnance system and the armament systems. The model is readily identified by the installation of sonobuoy chutes, visible in the lower aft fuselage of the aircraft and three additional small windows on the right side of the fuselage. Also, provisions for carrying a streamlined ESM pod-pylon assembly on a wing station are installed.

NEW

DIMENSIONS.

The overall aircraft dimensions are as follows:

Wing span	99 ft, 8 in.
Length	116 ft, 10 in.
Height to top of fin (antenna)	34 ft, 3 in.
Top of fin (antenna) to lower skin (FS 1185.5)	24 ft, 4 in.

GENERAL ARRANGEMENT. (Figures 1-2 and 1-3.)

The fuselage is pressurized from the forward bulkhead of the flight station to the aft bulkhead in the cabin. Entrance to the cabin is by way of the door in the left side of the fuselage. The flight station is entered from the cabin. Electro-mechanical folding steps, which stow in the cabin, can be used for personnel loading and unloading at stations where external loading ramps are not available. Emergency exit hatches are located over each wing in the sides of the fuselage, aft of the left aft windshield panel, and, in the top of the flight station. Lavatory, galley, and other convenience facilities are located in the aft fuselage. See the following illustrations of the typical crew stations.

Flight Station, Figures 1-4 through 1-8.

Tactical Coordinator (TACCO) Station, Figure 1-9.

NAV/COMM Operator Station, Figure 1-10.

Sensor 1 and 2 (SS-1 and SS-2) Operator Stations, Figure 1-11.

Sensor 3 (SS-3) Operator Station, Figure 1-12.

Ordnance Station, Figure 1-13.

Technician Station, Figure 1-14.

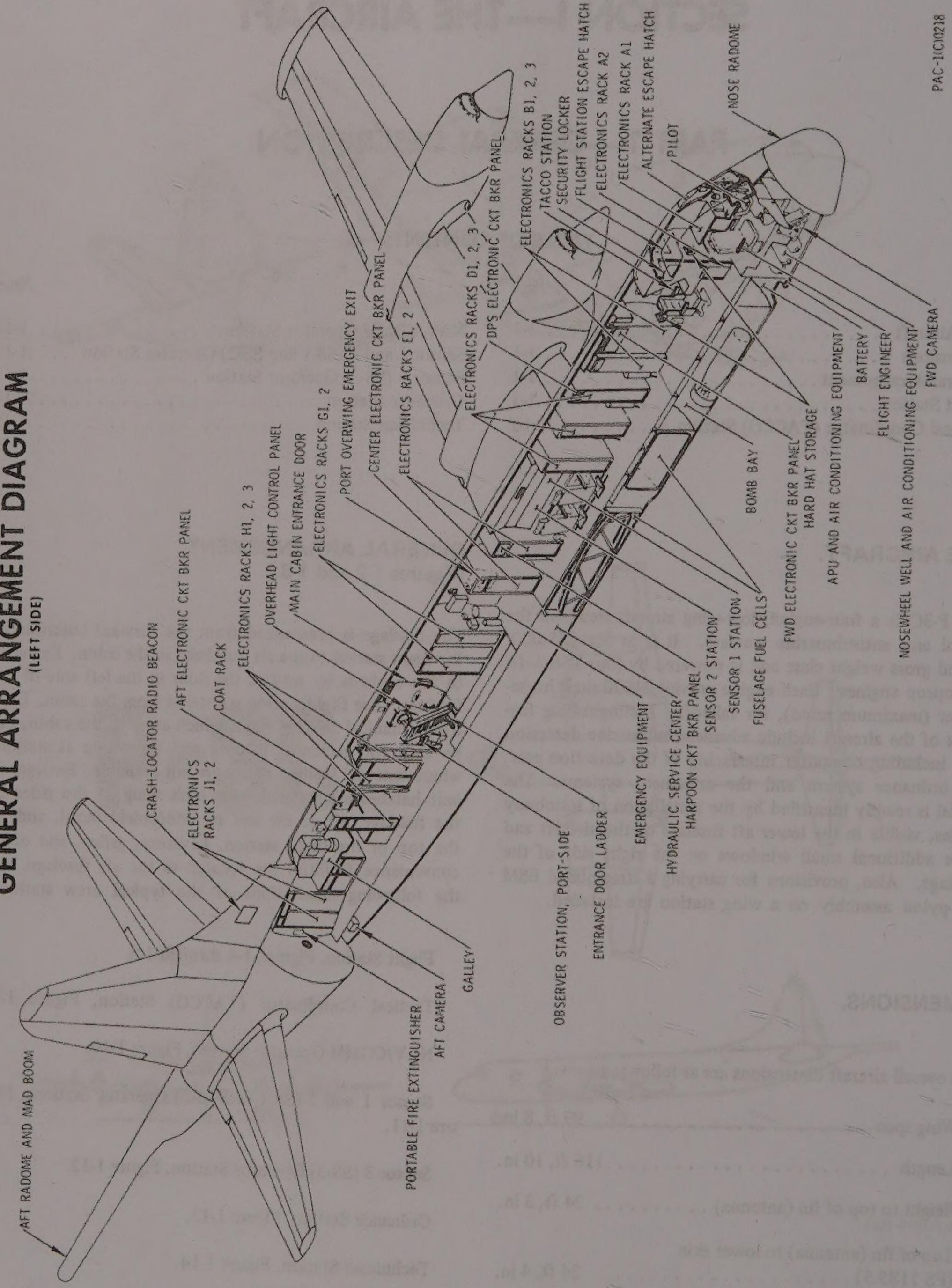

Figure 1-2. General Arrangement Diagram (Sheet 1 of 2)

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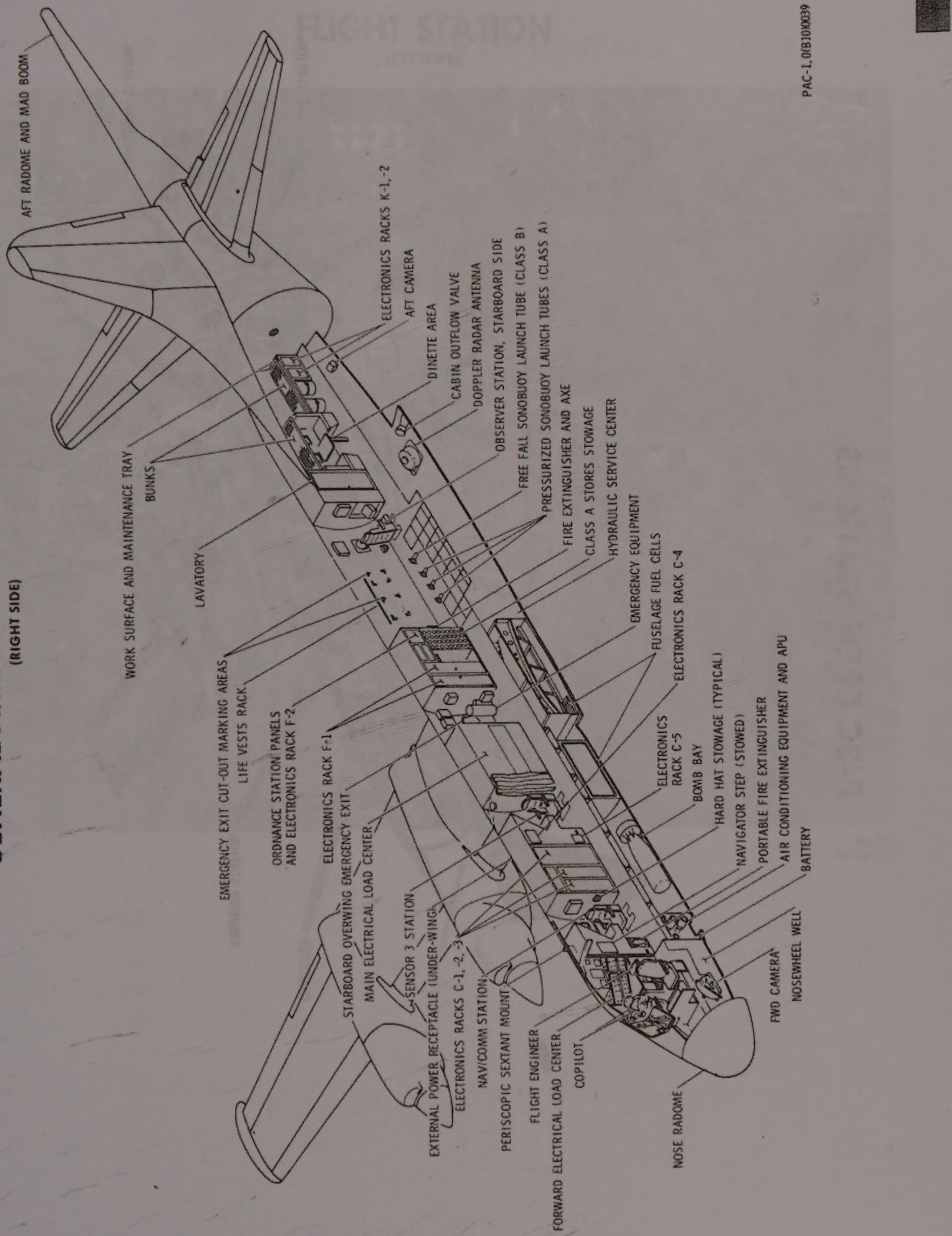


Figure 1-2. General Arrangement Diagram (Sheet 2 of 2)

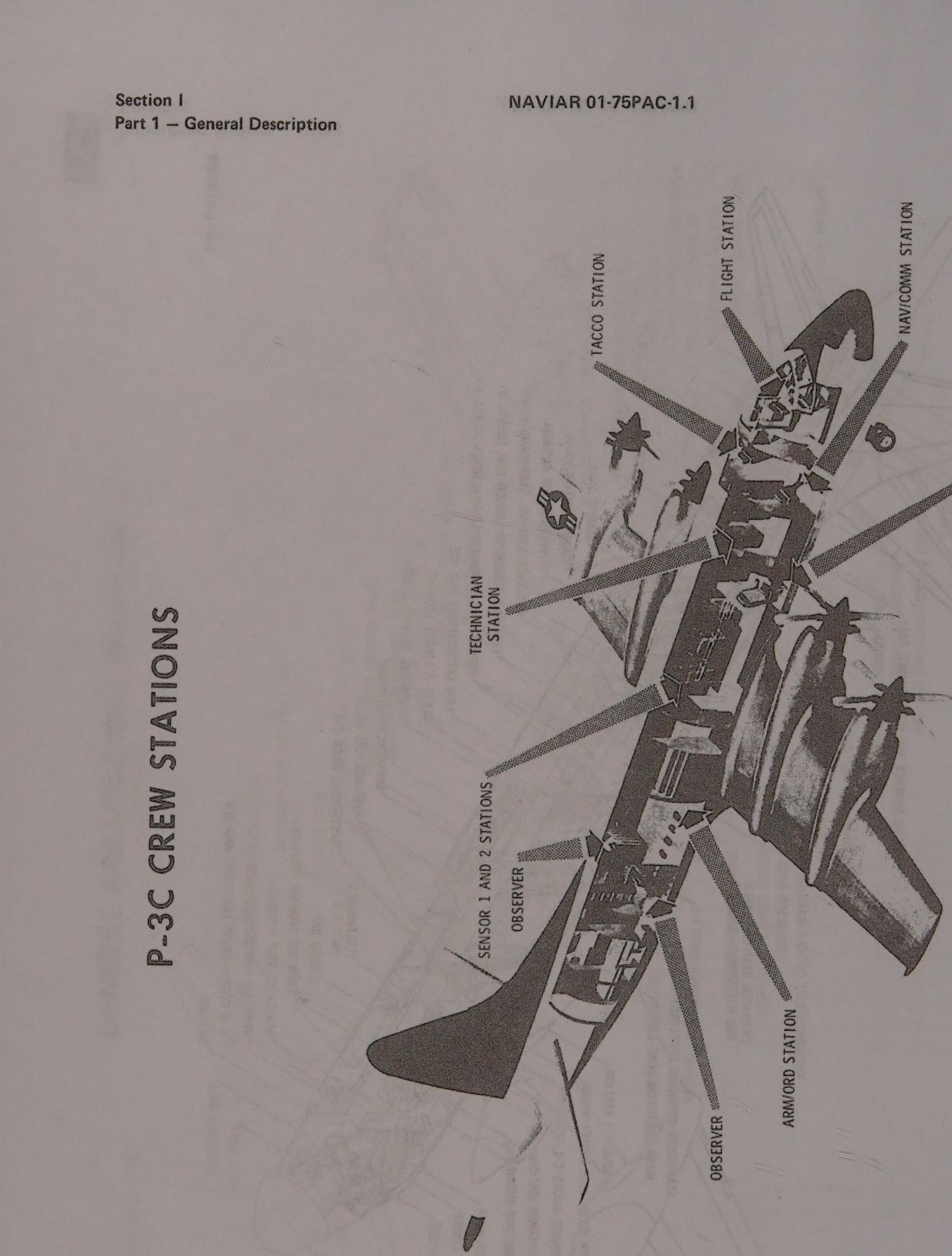
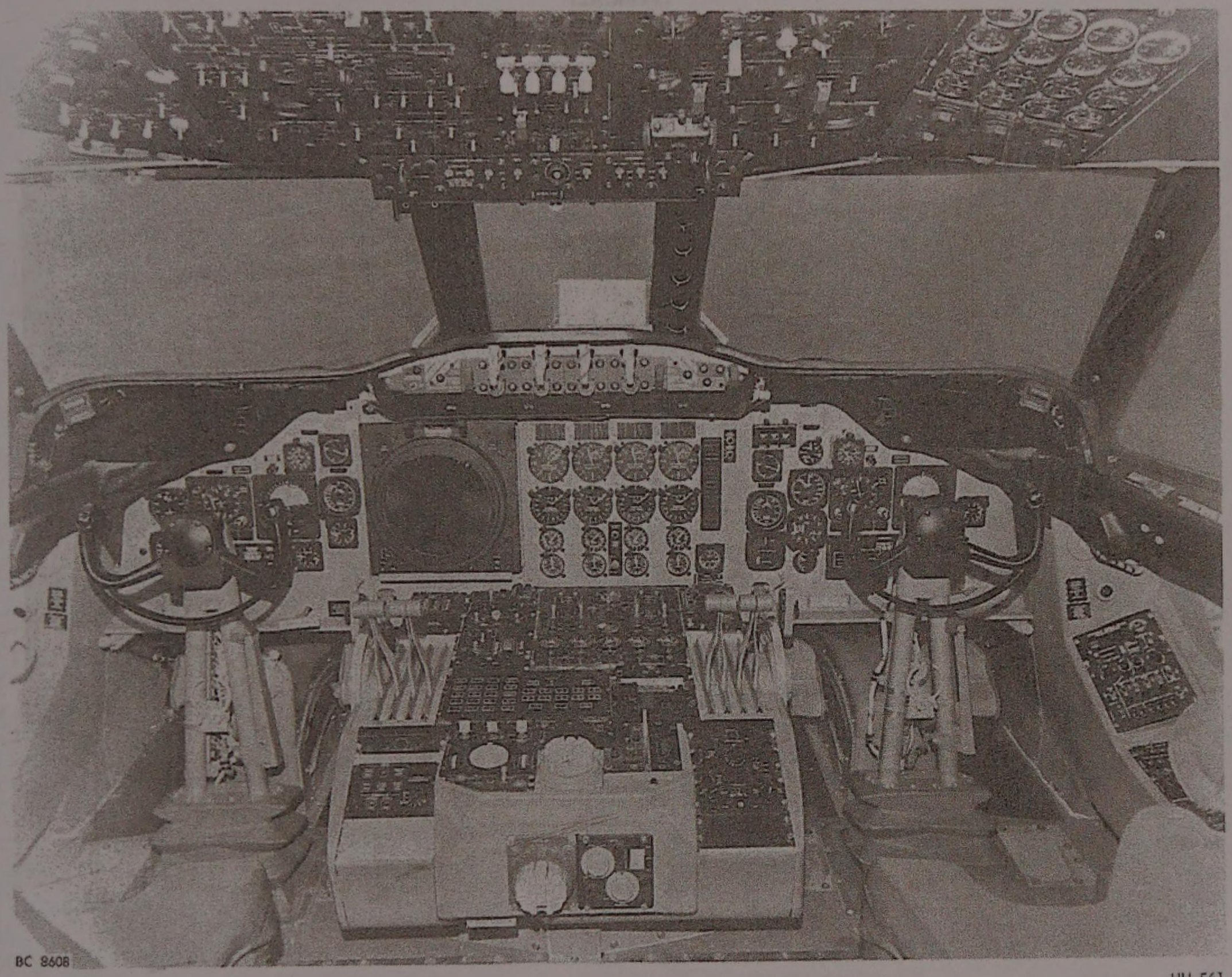


Figure 1-3. P-3C Crew Stations

FLIGHT STATION
(TYPICAL)



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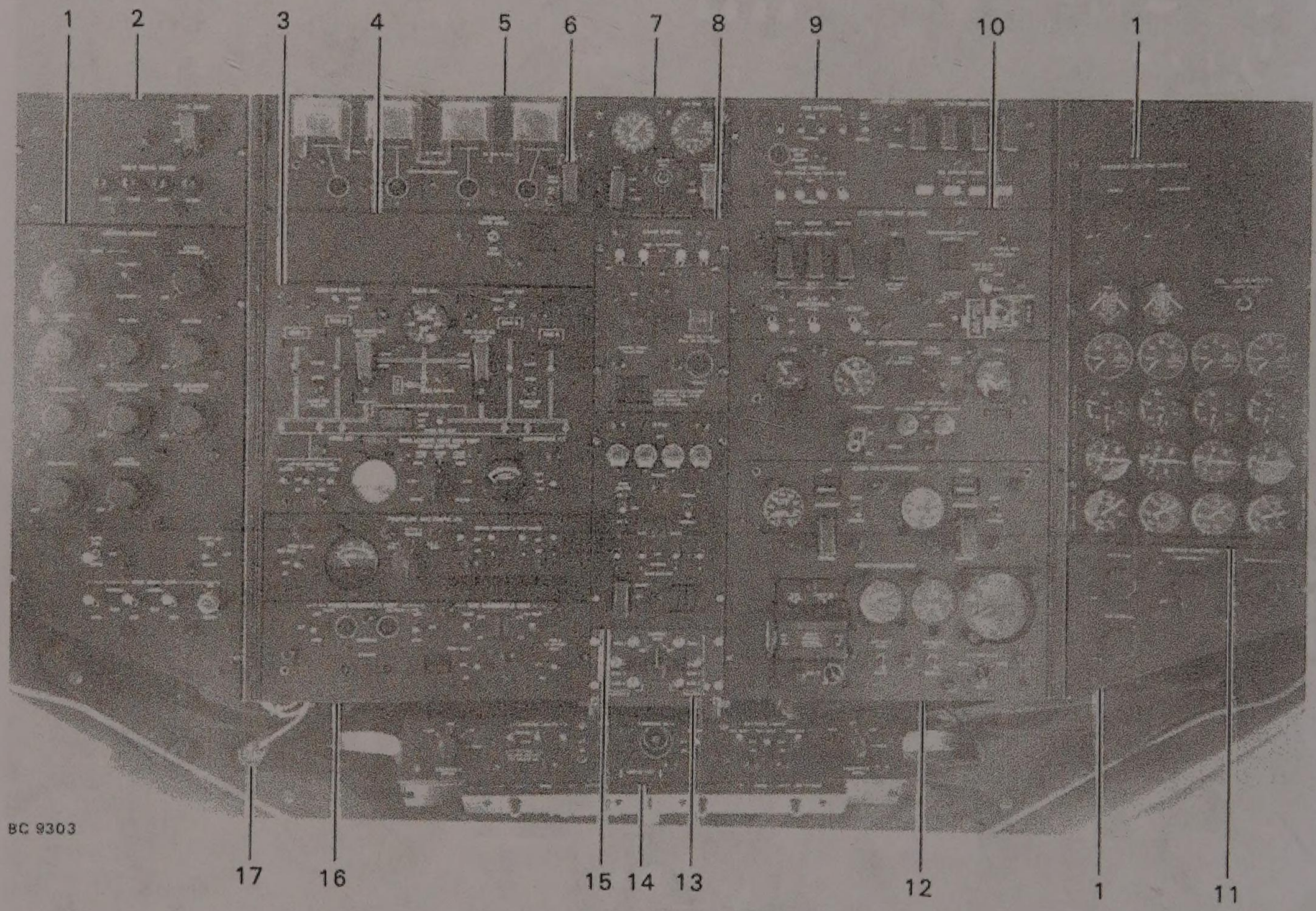
F141-P-1-13

Figure 1-4. Flight Station

FLIGHT STATION OVERHEAD CONTROL PANEL

(TYPICAL)

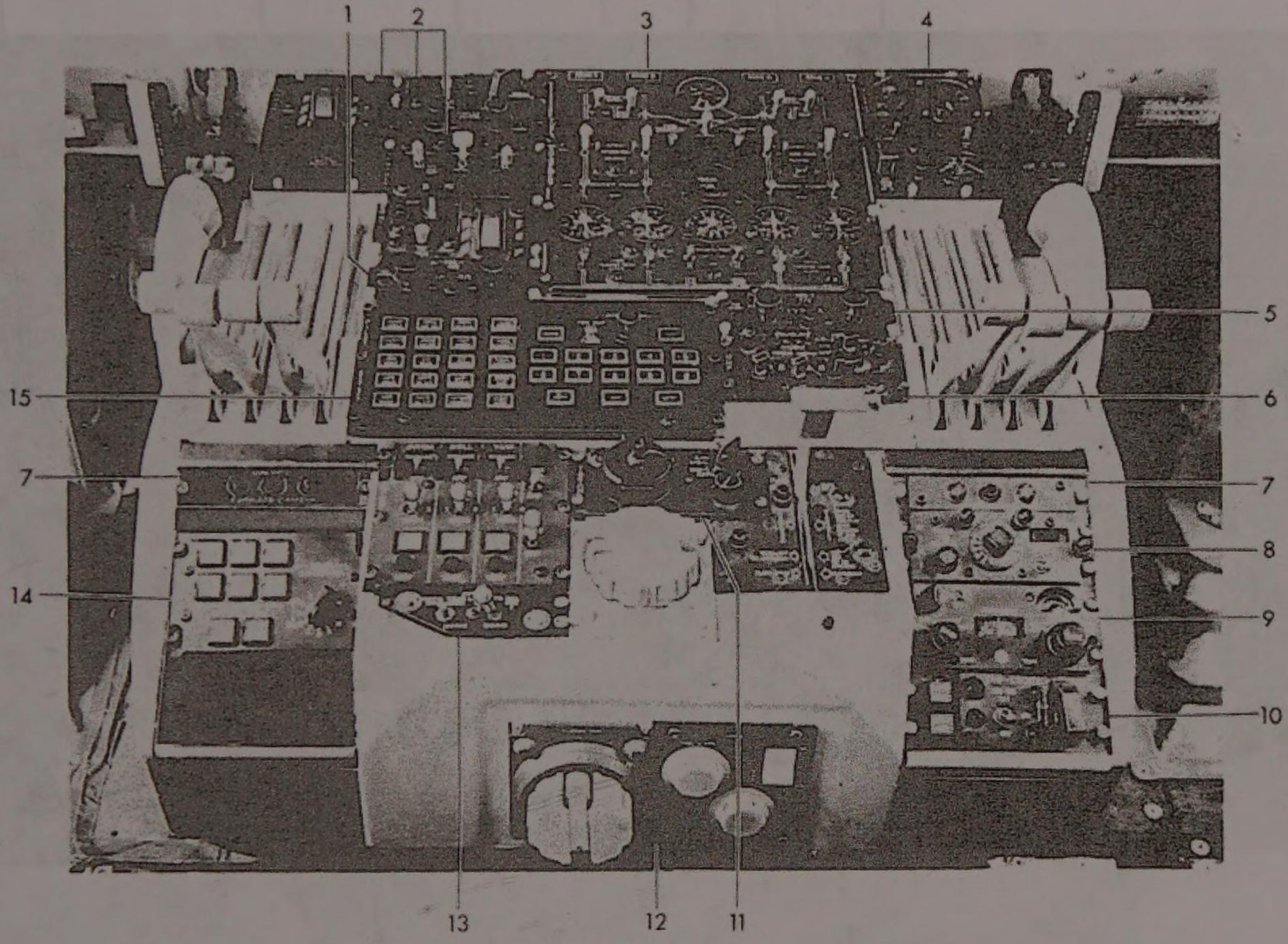


1 FLIGHT STATION MISCELLANEOUS LIGHTING CONTROL PANELS
2 FUEL DUMP PANEL
3 BLEED AIR AND ANTI-ICE CONTROL PANEL
4 NTS CHECK PANEL
5 FEATHER BUTTON PANEL
6 FEATHER TRANSFER SWITCH (NO. 1 AND NO. 4 POWER)
7 APU CONTROL PANEL
8 ENGINE START CONTROL PANEL
9 ENGINE CHECK PANEL
10 ELECTRIC POWER CONTROL PANEL
11 ENGINE OIL SYSTEM INSTRUMENTS
12 AIR CONDITIONING AND PRESSURIZATION CONTROL PANELS
13 SYNCHROPHASER CONTROL PANEL
14 EXTERIOR LIGHTS CONTROL PANEL
15 PROPELLER AUTO FEATHERING AND RPM CONTROL PANEL
16 ANTI-ICE CONTROL PANELS
17 POWER CANNON CONNECTOR FOR MK-8 GUNSIGHT

Figure 1-5. Flight Station Overhead Control Panel

CENTER CONTROL STAND

(TYPICAL)



1 VOR NO. 1 PANEL
2 ARMAMENT CONTROL PANELS
3 FUEL CONTROL PANEL
4 HYDRAULIC CONTROL PANEL
5 VOR NO. 2 PANEL
6 UHF CONTROL PANEL
7 FWD CAMERA CONTROL
8 OTPI CONTROL PANEL
9 ADF CONTROL PANEL
10 UHF/KY-28 PANEL
11 TACAN CONTROL PANEL
12 FLC CKT BKR AND PEDESTAL RED LIGHT CONTROL
13 ASW-31 AFCS CONTROL PANEL
14 FDS CONTROL PANEL
15 KEYSET PANEL

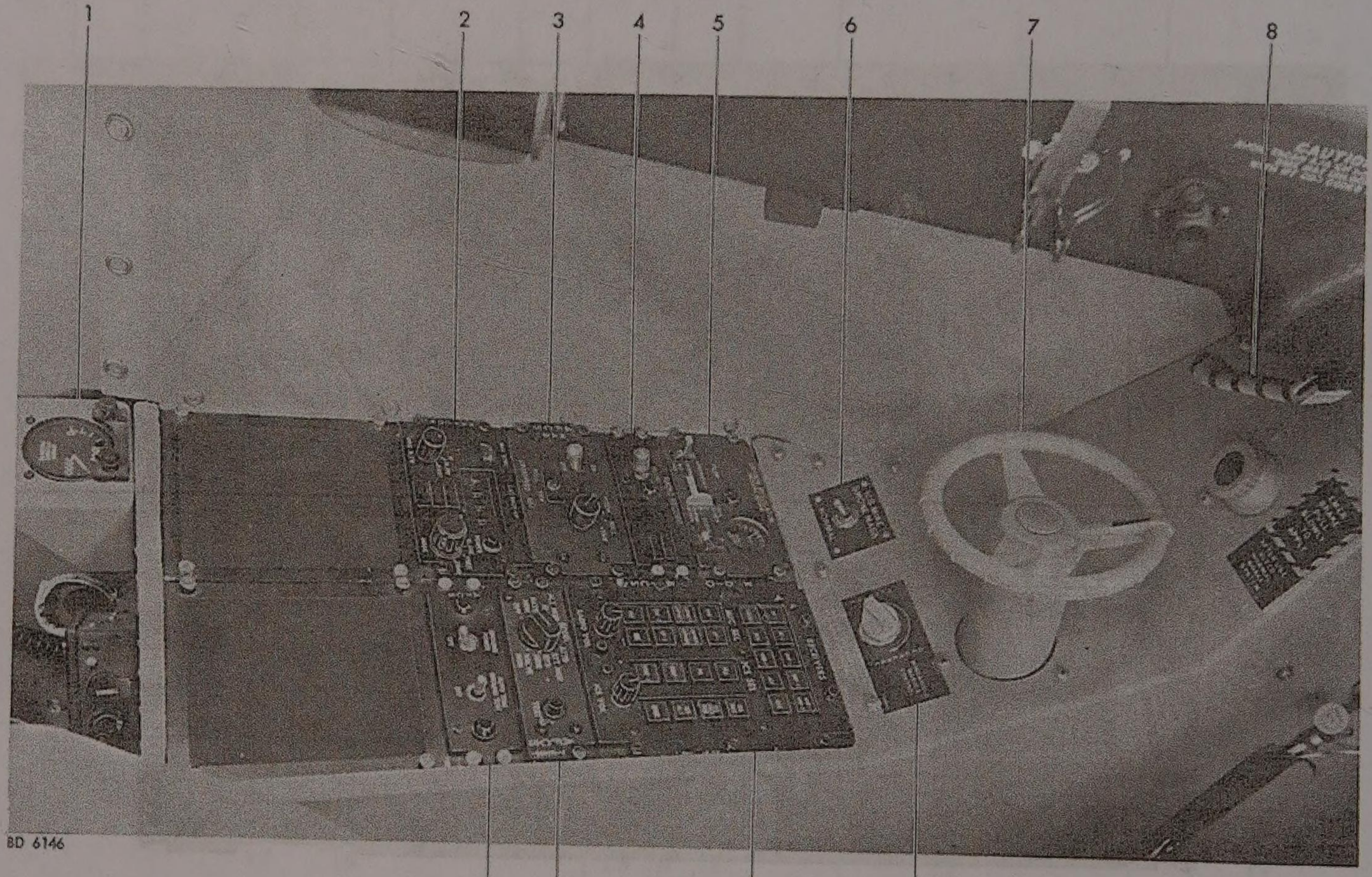
NOTE

ON AIRCRAFT 159889, 161132 AND SUBSEQUENT THE VOR-1 AND VOR-2 PANELS ARE REPLACED WITH VHF 313N-4B PANELS A VHF 313N-5 COMM PANEL IS ALSO ADDED

PAC-1(C3)0233

Figure 1-6. Center Control Stand

PILOT SIDE PANEL

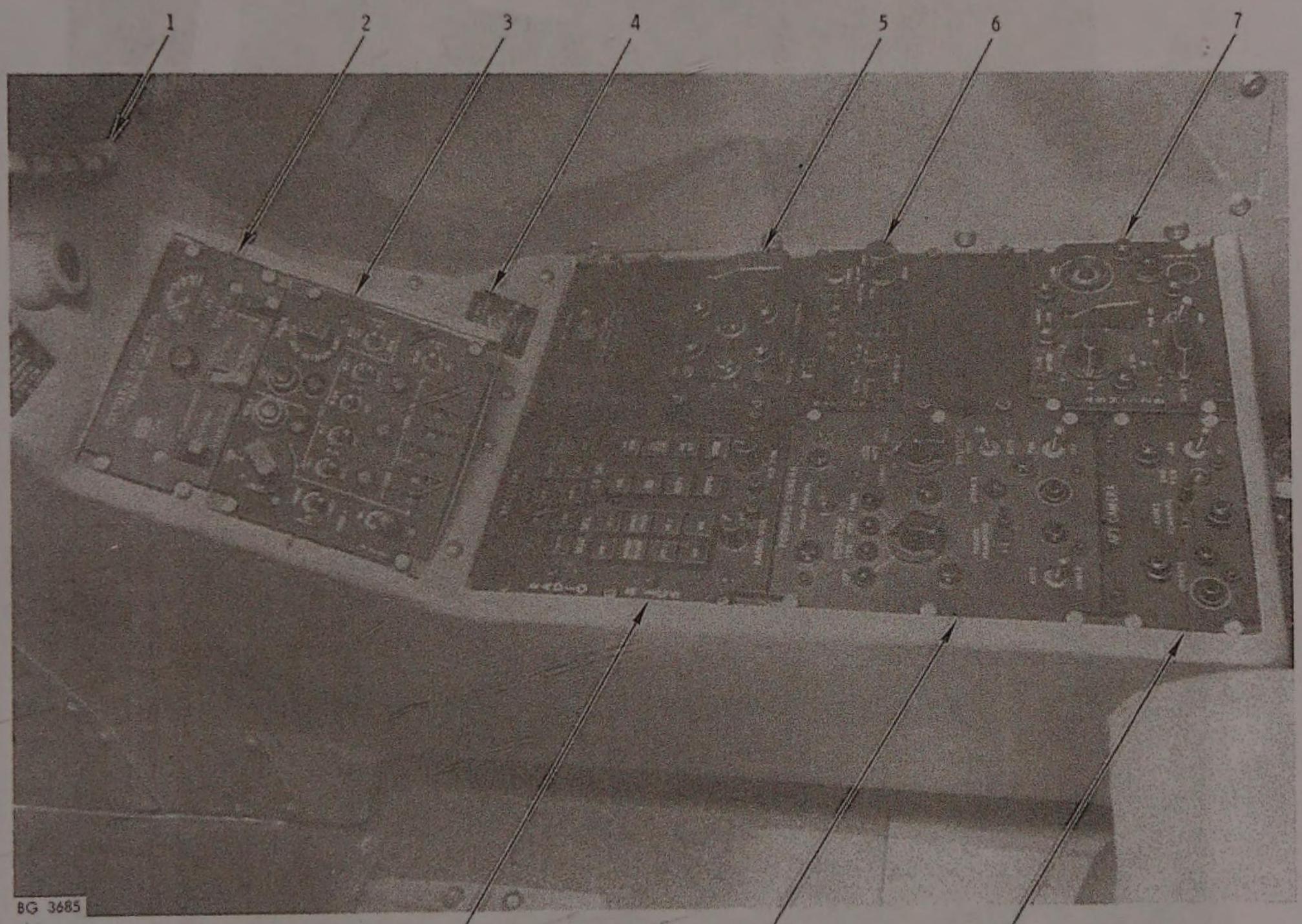


1 OXYGEN SYSTEM PRESSURE GAGE
2 NAVIGATION CONTROL PANEL
*3 ASW-31 AFCS-MAD MANUEVER PROGRAMMER PANEL
4 RADIO RECORD PANEL
5 OXYGEN SYSTEM CONTROL PANEL
6 ICS-SMOKE MASK SWITCH
7 NOSEWHEEL STEERING CONTROL
8 EMER BRAKE CONTROL
9 WINDSHIELD WASHER CONTROL
10 RADIO AND ICS CONTROL PANEL
*11 ASW-31 AFCS TEST PANEL
12 AFCS GROUND TEST PANEL

*BUNO 156514, 157310 AND SUBSEQUENT

Figure 1-7. Pilot Side Panel

COPILOT SIDE PANEL (TYPICAL)



1	EMER BRAKE CONTROL	6	NAVIGATION CONTROL PANEL
2	OXYGEN CONTROL PANEL	7	AGM-12B CONTROL PANEL (NOT USED)
3	IFF CONTROL PANEL	8	CAMERA CONTROL PANEL (AFT)
4	ICS-SMOKE MASK SWITCH	9	CAMERA CONTROL PANEL (FWD)
5	CRASH LOCATOR CONTROL PANEL	10	RADIO AND ICS CONTROL PANEL

Figure 1-8. Copilot Side Panel

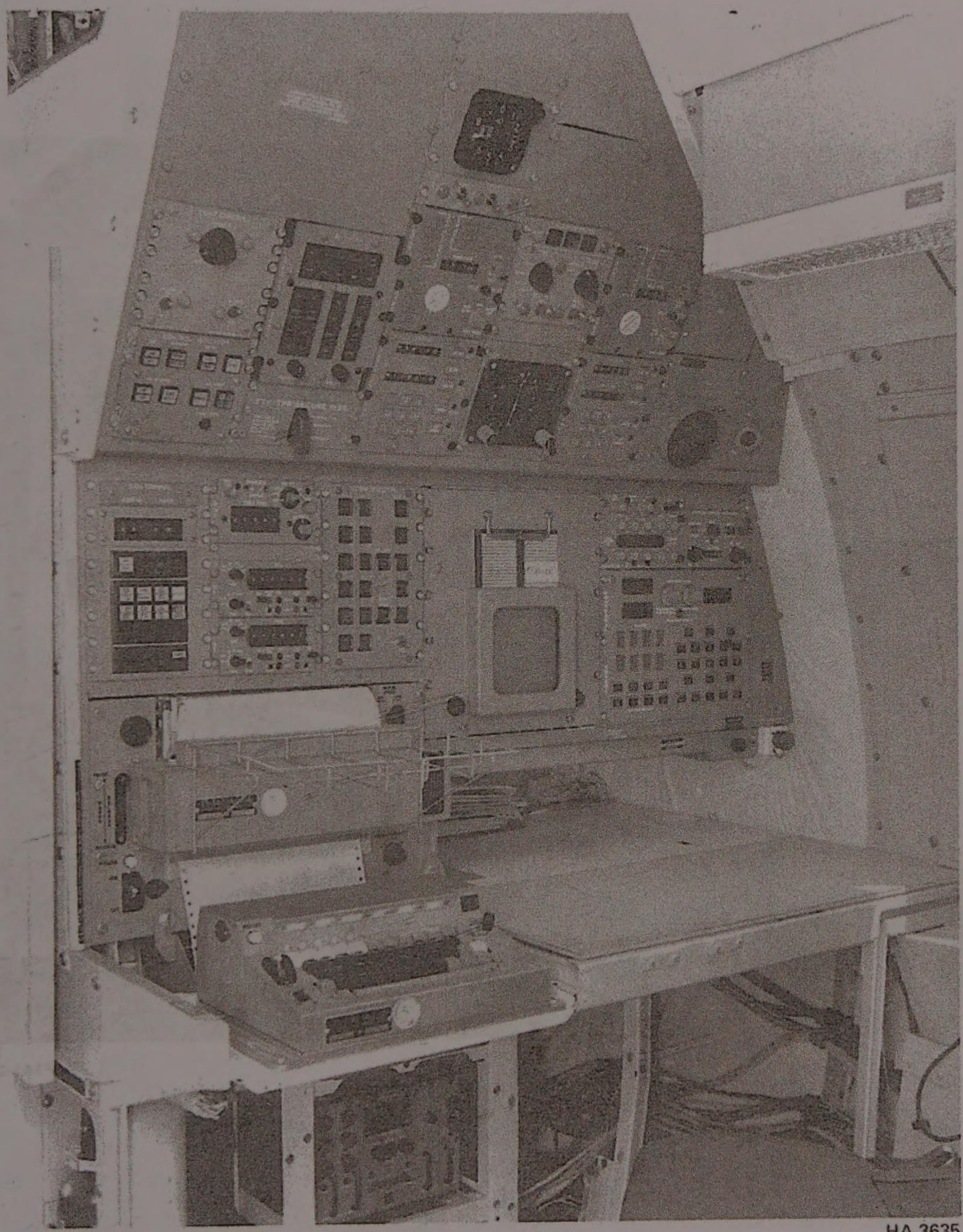
TACTICAL COORDINATOR (TACCO) STATION (TYPICAL)

BM8845

HA 3634
F141-3-1.0-1-004

Figure 1-9. Tactical Coordinator (TACCO) Station

NAV/COMM OPERATOR STATION (TYPICAL)



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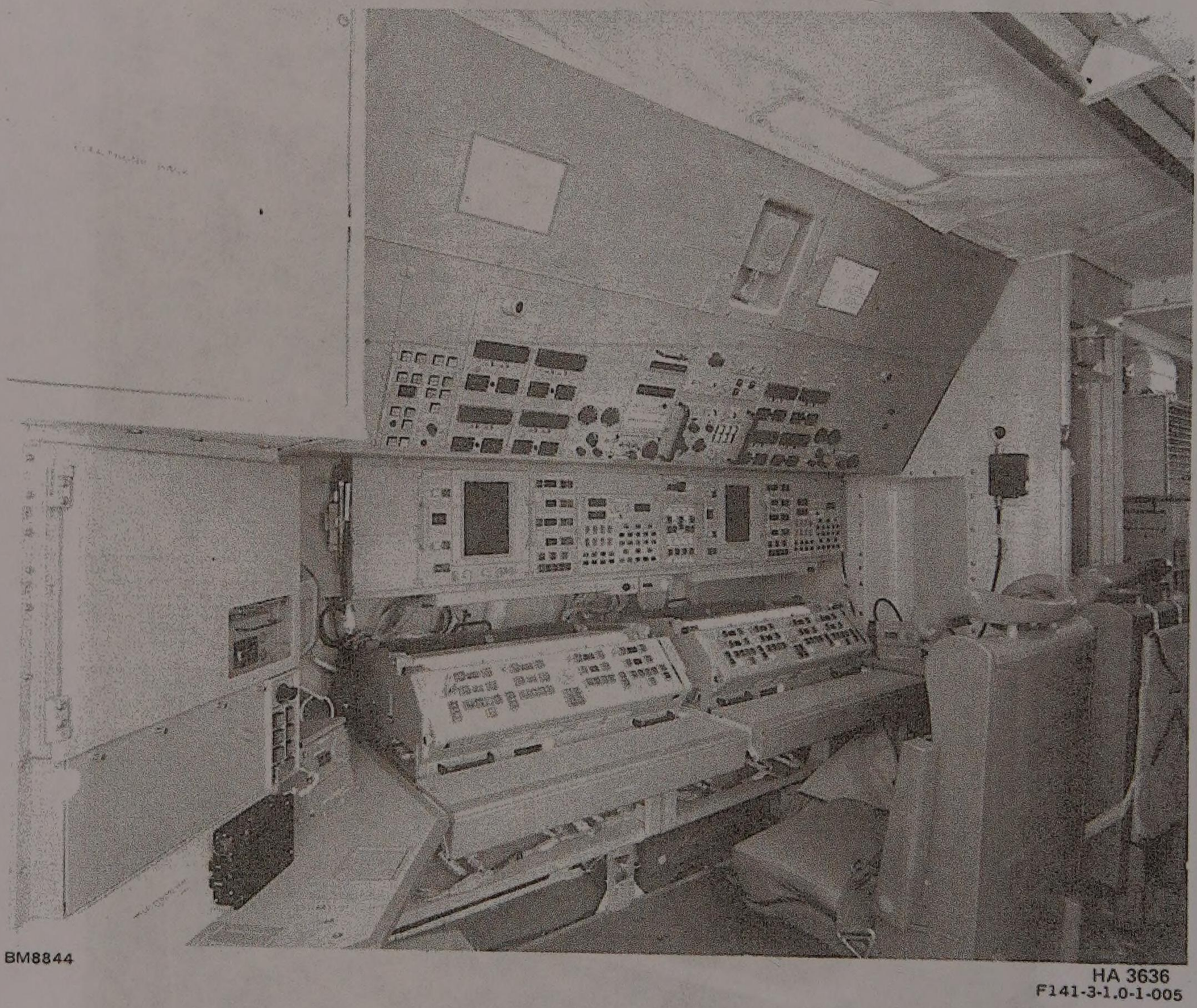
HA 3635
F141-3-1.0-1-006

Figure 1-10. NAV/COMM Operator Station

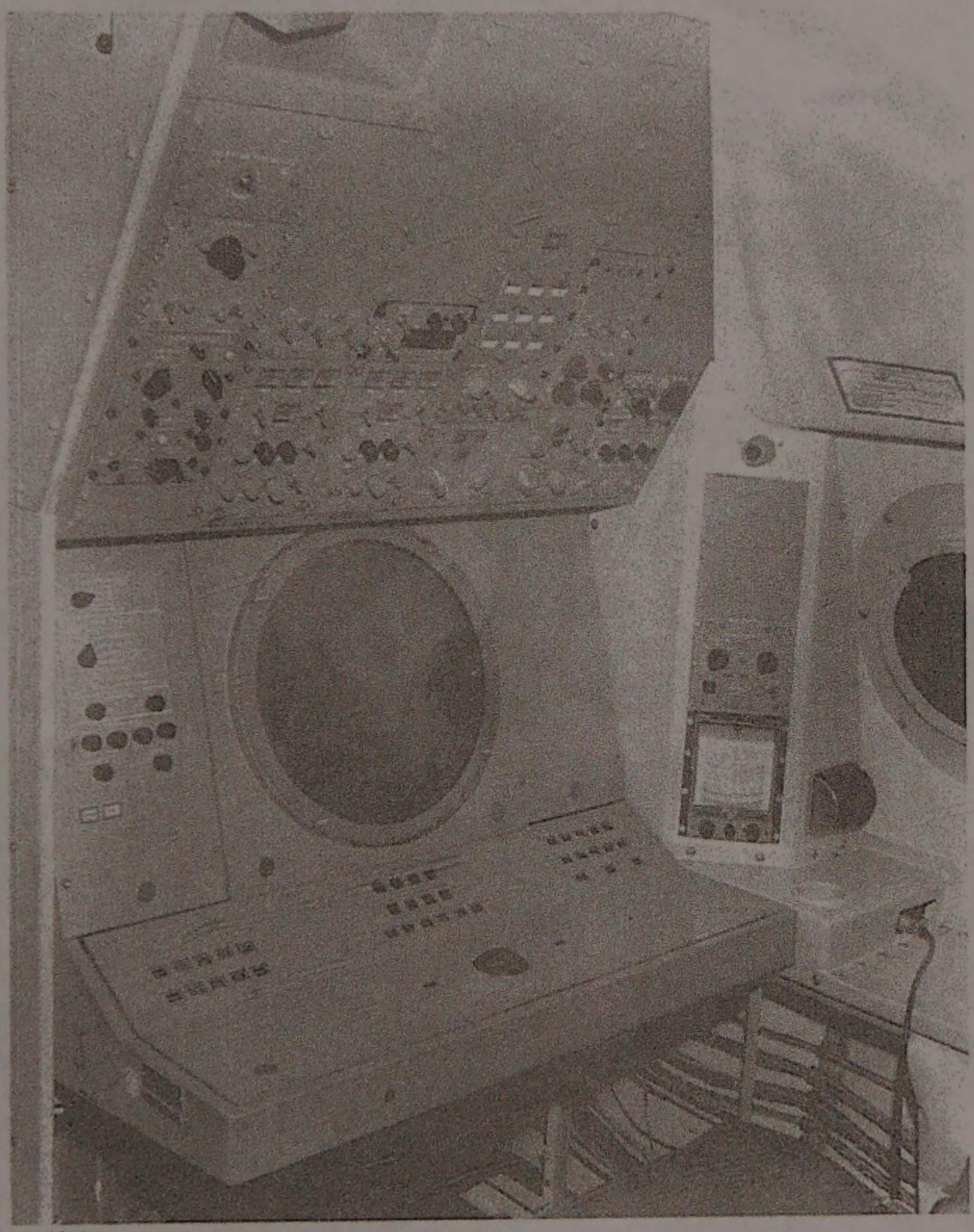
SENSOR 1 AND 2 OPERATOR STATIONS (TYPICAL)



BM8844
HA 3636
F141-3-1.0-1-005

Figure 1-11. Sensor 1 and 2 Operator Stations

SENSOR 3 OPERATOR STATION



BM4675

PAC-1.0(B10)0056

Figure 1-12. Sensor 3 Operator Station

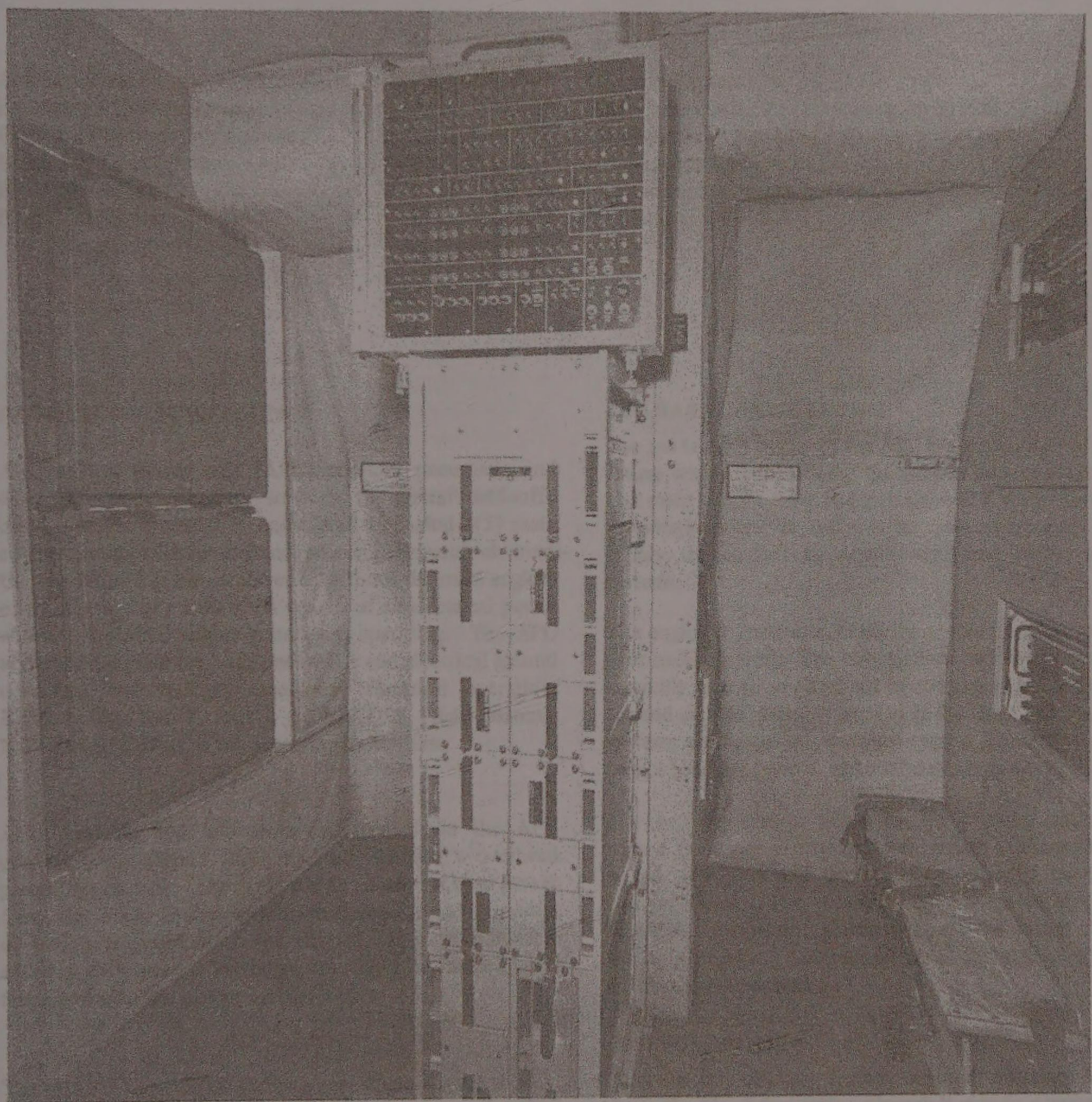
ORDNANCE STATION

BE 3159

PAC-1.0(B10)0059

Figure 1-13. Ordnance Station

TECHNICIAN STATION



BE 3162

PAC-1.0(B10)0060

Figure 1-14. Technician Station

PART 2—SYSTEMS DESCRIPTION (GENERAL)

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AUXILIARY POWER UNIT.

An auxiliary power unit (APU) provides pneumatic and electrical power necessary to make the aircraft self-sufficient. Self-sufficiency is considered to include (1) main engine starting without external power, (2) aircraft air conditioning without external power or without the main engines operating, and (3) a 60 KVA source of ac electrical power without the main engine generators operating. The APU system is designed for both pneumatic and electrical ground operation and in-flight emergency electrical operation. Refer to Section 1, Part 4 of NATOPS Flight Manual, NAVAIR 01-75PAC-1 for operating limitations.

APU controls and indicators are located on the APU control panel (figure 1-15) and on the pilot's overhead panel (figure 1-5). The APU starter motor receives power from the main dc bus extension if monitorable essential dc power is available to the aircraft. If no monitorable essential dc power is available, the flight essential dc bus feeds power to the starter motor.

The APU is capable of starting any single engine at field elevations up to 6000 feet and at temperatures of -65°F to +130°F (-54°C to +54°C). It is designed to supply only one of the systems requiring pneumatic power at a time, i.e., either engine starting or air conditioning. However, pneumatic and electrical power may be used independently or simultaneously. Under critical conditions the pneumatic power output of the APU is limited to sustain the electrical load on the system.

APU GAS TURBINE ENGINE.

The gas turbine engine of the APU is a self-contained power source which requires only the aircraft battery for starting. The main output drive pad powers a 60 KVA ac generator. Pneumatic power is available as clean compressed air to supply the aircraft air conditioning and engine starting systems.

The engine is composed basically of two main sections and four main systems. The two sections include an accessory assembly located at the front of the engine and a compressor and turbine assembly located at the rear. The four main systems consist of an electrical system, a fuel control system, a bleed air system, and a lubrication system.

The engine develops power by compressing ambient air with a two-stage centrifugal compressor. Compressed air, mixed with fuel and ignited, drives a radial inwardflow turbine wheel. The rotating shaft of the turbine wheel drives the compressor, accessories, and the output shaft to the ac generator. Compressed air is obtained by bleeding air from the compressor.

APU FUEL SYSTEM.

Fuel for the APU gas turbine engine is normally supplied from the No. 2 fuel tank, although it may be supplied from any tank through the crossfeed system. It is routed to the APU through a manual shutoff valve, a fuel filter, and a solenoid-operated fuel shutoff valve. The solenoid fuel shutoff valve is opened automatically when the APU control switch is positioned to START. The APU consumes approximately 300 pounds per hour when operating a normal electrical load and the air conditioning system.

APU CONTROL PANEL

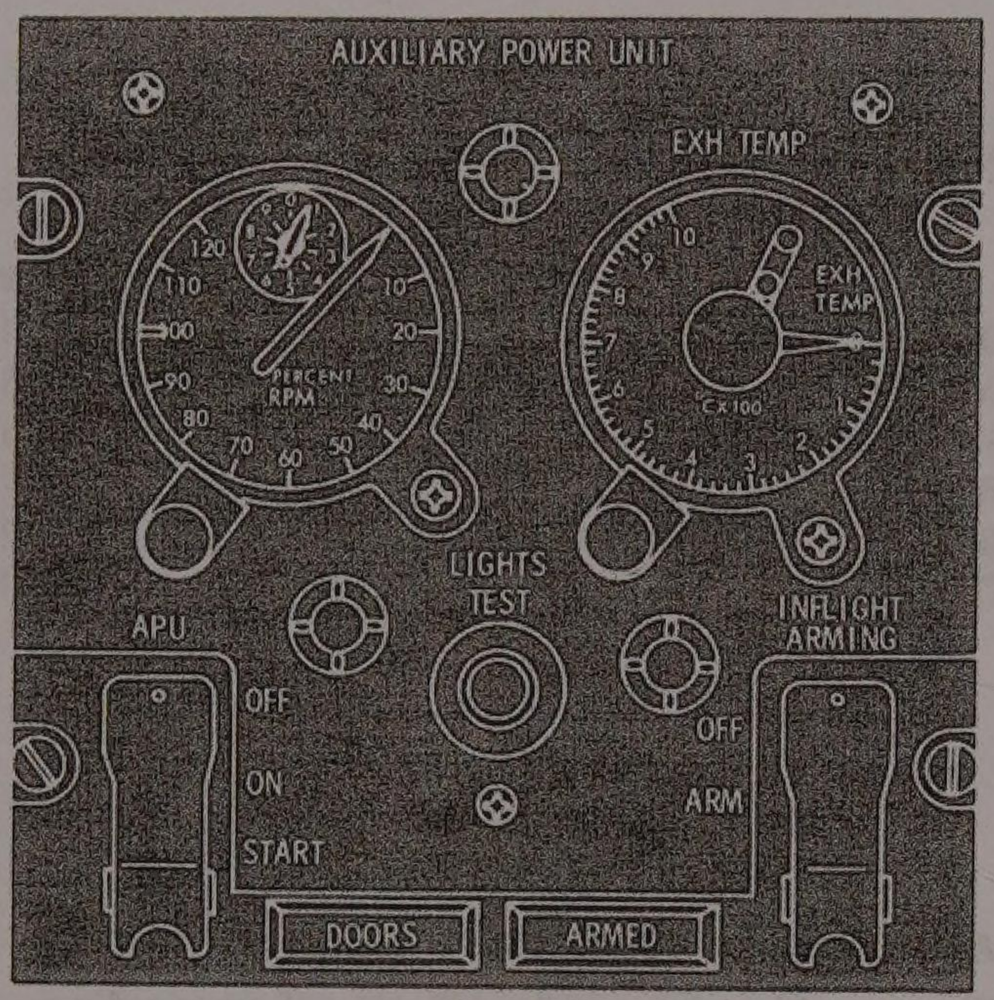

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Figure 1-15. APU Control Panel

APU GENERATOR SYSTEM.

The APU generator provides 60 KVA, 3-phase, 400 Hz electrical power. Its control and protective circuits are identical to those of the three engine-driven generators. The APU generator will assume the electrical loads lost during malfunctions of the main engine-driven generators. An APU load monitoring relay drops out additional loads if the aircraft is required to operate on APU generator only while in flight above 8000 feet. During low rpm engine operation, electrical power can be supplied by placing the APU on the line.

APU FIRE PROTECTION SYSTEM.

A continuous element fire detection system is installed in the APU compartment. When a fire is detected, warning lights will glow on the right side of the glareshield panel (figure 1-16) and warning horns will sound in the flight station and cabin during ground operation. In flight, only the flight station horn will sound. The system will automatically shut down the gas turbine engine and close the bleed air shutoff valve, the fuel shutoff valve, and the intake and exhaust doors. When the exhaust door is closed (approximately 15 seconds) the HRD bottle will automatically discharge. In the event the exhaust door fails to close, or its limit switch malfunctions, the bottle will discharge automatically 5 seconds later. The extinguishing agent comes from an 86-cubic-inch bottle mounted in the nosewheel well. Actuation of the APU fire detection system will occur when the APU compartment sensing elements detect a temperature of 400°F.

APU CONTROLS.

APU Control Switch. The guarded APU control switch, located on the APU overhead control panel, is labeled OFF, ON, and START. It is used for starting and stopping the unit. It is spring-loaded to the ON position from START. Placing the switch in the ON position (only), opens the inlet and exhaust doors for preflight inspection. In the OFF position, the APU will shut down and the inlet and exhaust doors will close after approximately a 1 minute time delay.

Generator Switch. The APU generator switch is identical to the engine-driven generator switch in operation. The switch is located on the electrical power control panel (figure 1-24) and is labeled ON, OFF, and RESET.

In-Flight Arming Switch. The guarded APU in-flight arming switch located on the APU control panel has two positions, OFF and ARM. In the ARM position the nose landing gear uplock switch is bypassed, energizing the ground dc bus to allow APU operation during in-flight emergencies. If this switch is positioned to ARM while the aircraft is on the ground, air conditioning, engine starting, and bomb bay heating will not be available from the APU.

LIGHTS TEST Switch. The LIGHTS TEST switch is located on the APU control panel. It can be used to test the DOORS and ARMED lights at any time and when the APU generator switch is ON, to test the APU GEN OFF light after APU stabilization.

APU Fire Extinguishing Manual Release Switch. The extinguishing agent can be discharged manually from the flight station by actuation of the manual release switch located adjacent to the APU fire detection indicator lights on the right side of the glareshield panel (figure 1-16). In addition, actuation of this switch shuts off the APU fuel supply and closes the compartment doors.

APU Fire Detector Test Switch. The APU fire detector test switch, located on the engine check portion of the overhead panel in the flight station, is provided to test operation of the detector control unit and continuity of the detector sensing loop. Operation of the switch to the TEST position causes the APU fire warning lights on the glareshield to light and the fire warning horn(s) to sound if the system

is operating properly. On the ground, both horns will sound; in flight, only the flight station horn will sound. The switch has a TEST and a NORMAL position. The TEST position disables the APU fire protection discharge system during the test sequence. Electrical power for the test circuit is provided through the APU essential dc bus.

APU and APU Fire Extinguisher Safety Switch. The APU safety switch, accessible through a door on the left side of the fuselage forward of the APU, is used during ground maintenance to deenergize both the APU control circuit and the APU fire extinguisher release circuit.

APU INDICATORS.

DOORS Signal Light. The DOORS signal light, located on the APU control panel, illuminates at any time the APU inlet and exhaust doors are not in the closed position.

APU Generator-OFF Signal Light. The APU GEN OFF signal light, located on the electric power control panel (figure 1-24), is identical in operation to the engine-driven generator light when the APU switch is on and the APU is operating.

ARMED Signal Light. The ARMED signal light, located on the APU control panel, illuminates when the in-flight arming switch is in the ARM position. The armed signal light indicates only that the in-flight arming switch has been positioned to ARM and the dc ground bus is energized.

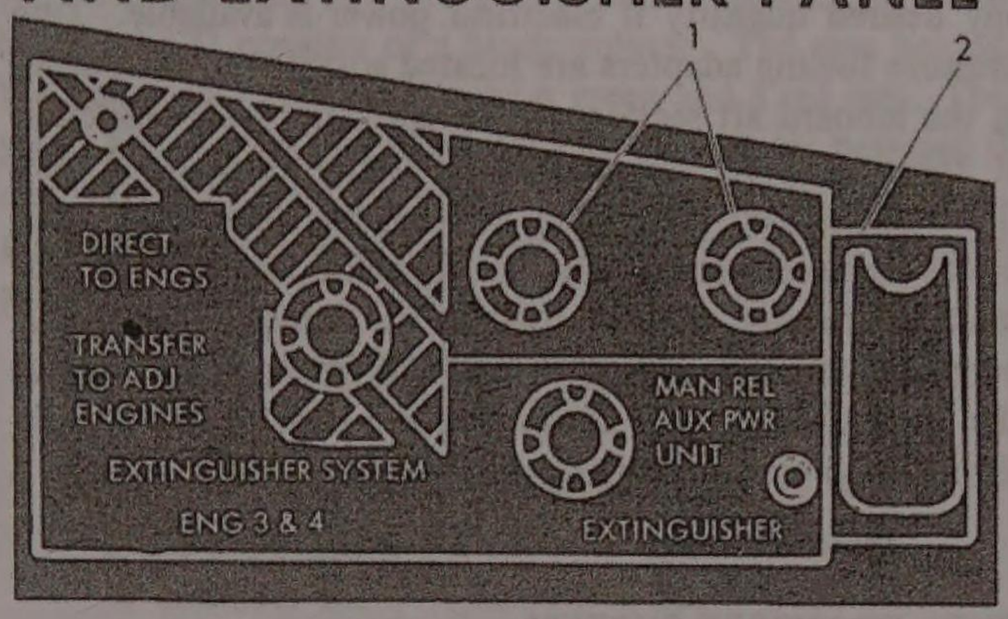
APU Tachometer. This instrument located on the APU control panel indicates the percent rpm of the gas turbine engine.

APU Exhaust Gas Temperature Indicator. An exhaust gas temperature indicator for the APU gas turbine engine is located on the APU control panel.

FUEL SUPPLY SYSTEM.

The fuel system consists of five tanks, a fueling system, a transfer system, a crossfeed system, and a dump system (see figure FO-8). The fueling system permits conventional overwing fueling, or pressure fueling and defueling under the wing. The transfer system transfers fuel as needed from tank 5 to the four wing tanks. The crossfeed system permits any wing tank to supply fuel to any engine. The fuel dump system provides a means for dumping fuel overboard from fuel tank 5 when desired. Fuel grades and specifications are shown in the Servicing Quantities tables (figure 1-50).

APU FIRE WARNING AND EXTINGUISHER PANEL



1 APU COMPARTMENT FIRE WARNING LIGHTS

2 APU COMPARTMENT FIRE EXTINGUISHER DISCHARGE SWITCH

Figure 1-16. APU Fire Warning and Extinguisher Panel

FUEL TANKS.

Four integral wing tanks and an auxiliary tank carry the fuel supply for the engines. The auxiliary tank, identified as tank 5, consists of a bladder-type fuel cell (fuselage tank) connected to an integral center-section tank. The bladder cell is located in the unpressurized area of the lower fuselage forward of the integral tank.

A fuselage tank fuel bay drain mast/vent is provided on the lower centerline of the aircraft. The mast is hinged to facilitate weapon loading. The mast must be in the locked vertical position for flight.

All tanks are automatically protected against excessive pressure during fueling and transfer.

Fuel Boost Pumps.

Each wing tank is equipped with a fuel boost pump consisting of a scavenge section and a boost section. The scavenge section discharges into a surge box while the boost section pumps fuel from the surge box to the engine-driven pump. In addition, they supply fuel flow for crossfeeding.

The fuel tank boost pumps for engines No. 1 and No. 3 receive power from main ac bus A through individual pump-control relays. The fuel boost pumps for engines No. 2 and No. 4 receive power from main ac bus B through other pump control relays. Each of the four pump control relays is energized by the main dc bus through the corresponding boost pump switch. A thermal switch opens the fuel boost pump circuit whenever the pump case temperature exceeds 400°F.

FUELING SYSTEM.

The fueling system allows pressure fueling of any tank to any desired quantity if electrical power is available. Two pressure fueling adapters are located adjacent to each other in the inboard aft section of the right-hand wing. (Suction at these adapters defuels the aircraft.) Pressurized fuel flows to the four wing tanks through the same valves used in the transfer system. The two pressure fueling valves for tank 5, however, are not used in the transfer system. A conventional flush-mounted fuel tank filler is provided at the top of each wing tank. Tank 5 can be fueled only through the pressure fueling system.

FUEL TRANSFER SYSTEM.

The fuel transfer system controls fuel flow from tank 5 to the wing tanks (see figure FO-8). A dual float-operated pilot valve, located at the full-tank level in each tank, closes a transfer valve, thereby disconnecting the tank from the fuel transfer manifold. A tank may be disconnected from the fuel transfer manifold at any time by closing the corresponding transfer valve switch (either on the fueling control panel or on the fuel management panel in the flight station), which closes the transfer valve. Either of the transfer pumps is capable of pumping fuel from tank 5 to the wing tanks, but both are normally used.

Fuel Transfer Pump.

The bladder cell is equipped with two transfer pumps. Each transfer pump consists of a scavenge section and a boost section. The boost section pumps fuel from the fuselage cell to any or all wing tanks. The scavenge section pumps fuel to the fuselage cell from the bottom of the center section tank. The forward transfer pump receives power from main ac bus A through a pump-control relay. The aft transfer pump receives power from main ac bus B through another pump-control relay. Each of the pump-control relays is energized by the main dc bus through the corresponding transfer pump switch. A thermal switch disconnects a transfer pump whenever the case temperature of the pump exceeds 400°F.

FUEL CROSSFEED SYSTEM.

The crossfeed system is composed of the fuel boost pumps, fuel control valves, and the crossfeed manifold. Pressure for crossfeeding is generated by the fuel boost pumps which are capable of pumping directly to the engines or into the crossfeed manifold but not into another tank.

FUEL DUMP SYSTEM.

A fuel dump system is provided for tank 5 only. This reduces the aircraft landing weight to within allowable limits with a corresponding reduced landing vertical sink rate. The system incorporates a fixed dump chute which extends over the left wing trailing edge. Fuel is dumped through the use of an electrically driven jettison pump installed in the center section tank, adjacent to the tank access panel and the tank 5 transfer pumps which are simultaneously activated to augment jettison flow; therefore, if the fuel transfer valves are shut off during fuel dump, a lower landing gross weight will be effected as a result of fuel burn-out from the main tanks. A check valve prevents backflow to the jettison pump during normal fuel transfer. Actuation of a single switch starts the dumping.

Fuel Dump Switch. The single, guarded two-position fuel dump switch, labelled ON and OFF, is located on the pilot's overhead lighting control panel. Turning it ON starts the jettison pump, transfer pumps and opens the dump valve, allowing fuel to be jettisoned overboard. The switch and valve are powered by the main dc bus through circuit breakers located on the main dc bus circuit breaker panel. The 3-phase jettison pump is powered through a ganged circuit breaker located on the main ac bus A panel at the main electrical load center.

FUEL SYSTEM CONTROLS AND INDICATORS.

The fuel system controls and indicators are located primarily on two panels, the fueling control panel and the fuel management panel. The panels are described individually in the following paragraphs.

Fueling Control Panel.

The fueling control panel (figure FO-8), located in between the pressure fuel adapters, is the control center for fueling and defueling. Also, the panel enables the pressure fueling valves to be checked before fueling begins. A service light on the fueling control panel lights whenever the fueling panel service door is opened. This light is powered by the main dc bus through the service door switch. An inclinometer is mounted adjacent to the panel for attitude reference when using the hydrostatic fuel quantity gage equipment. The following controls and indicator lights are on the fueling control panel:

Fueling System Power Switch. The solenoid-held system power switch is placarded ON and OFF. When the switch is placed in the ON position a master relay is energized which transfers control of the pressure fueling valves from the fuel management panel to the fueling control panel and prepares a test to determine if the pressure fueling

valves will close when the tank is full. Also, with the system power switch in the ON position, the reset light on the fuel management panel lights to indicate fueling is in progress. The master relay is energized from the main dc bus through the system power switch.

Fueling System Check Switch. The three-position system check switch is placarded PRIMARY, OFF, and SECONDARY. When the system check switch is in the PRIMARY or SECONDARY position the primary or secondary pilot valve test solenoid, respectively, is energized in each tank. With these solenoids energized and fuel pressure at a pressure fueling adapter, a full-tank condition is simulated. The pilot valve test solenoids are energized by the main dc bus through the system check switch and the system power switch. The switch also has an OFF (center) position.

Fuel Valve Control Switches. Four of the six pressure fuel valve control switches are identified by tank number, except that the two center switches control tank 5. The two-position switches are placarded OPEN and CLOSED. When the switch is in the OPEN position a control solenoid is energized, thereby opening the corresponding pressure fuel valve when fuel pressure is applied to the valve. The control solenoid is energized from the main dc bus through contacts of the energized master relay and the pressure fuel valve switch. When the switch is in the CLOSED position the fuel valve is closed. The tank valves close automatically when the tank is full.

Fuel Valve Closed Light. A green indicator light, placarded VALVE CLOSE INDICATION, illuminates when the corresponding pressure fueling valve closes. The lights are energized from the main dc bus through the service door switch, and primary or secondary valve close limit switches.

Indicator Lights Test Switch. Pressing the indicator lights test switch illuminates the serviceable VALVE CLOSE INDICATION light to discover defective lamps. The indicator lights are energized from the main dc bus through the service door switch and the indicator lights test switch.

Fuel Quantity Gages. Five fuel quantity gages indicate quantity of fuel in the separate tanks. The gages for the four wing tanks are marked 0-12 x 1000 pounds, and the tank 5 gage is marked 0-18 x 1000 pounds. The gages are powered from the main ac bus A.

Fuel Quantity Gages Test Switch. A switch, placarded TEST GAGE, is provided to determine the usability of the fuel gages. Pressing the gage test switch energizes a test relay, which drives the needle of correctly operating gages toward zero. The test relay is energized from the main dc bus through the gage test switch.

Fuel System Venting. A float-operated pressure relief valve is installed in tanks 1 and 4 to provide protection against wing damage from overfilling during pressure fueling. A fuel monitoring and overpressurization indicating system (figure 1-17) consists of a black pointer. The area behind the pointer is divided between a green and a red area. The green area covers the movement of the pointer between 0 and 7.0 psi (safe). Above 7.0 psi the pointer will be in the red area (overpressurized) and will latch at the highest pressure sensed.

WARNING

If during pressure fueling cycle the black pointer contacts the overpressure indication line on tank 5 pressure gage, fueling must be halted immediately and a visual inspection of tank 5 shall be accomplished prior to any flight.

Fuel Management Panel.

The fuel system is controlled from the fuel management panel whenever the system power switch on the fueling control panel is in the OFF position. The fuel management panel is laid out in the form of the fuel system schematic diagram. (See figure FO-8.) The panel, located on the center control stand, contains the following controls and indicators:

Fuel Transfer Valve Switches. There are four fuel transfer valve switches, one for each main tank. The switch positions are OPEN and CLOSED. Placing a transfer valve switch in the OPEN position energizes the corresponding control solenoid, which opens the transfer valve (if fuel pressure is available) and prepares the corresponding tank to accept fuel from tank 5. The control solenoid is energized by power from the main dc bus through contacts of the deenergized master relay and the transfer valve switch.

Fuel Boost Pump Switches. There are four boost pump switches, one for each main tank. The switch positions are ON and OFF. Placing a boost pump switch in the ON position energizes a boost pump relay, which starts the correspoinding boost pump. The boost pump relays are energized by power from the main dc bus extension, through the boost pump switches.

Fuel Boost Pump Low Pressure Lights. Boost pump low pressure lights indicate BOOST whenever the output pressure of the corresponding boost pump drops below a safe value. Two additional indicators are located at the bottom of the panel. These indicators serve the same function for

NEW

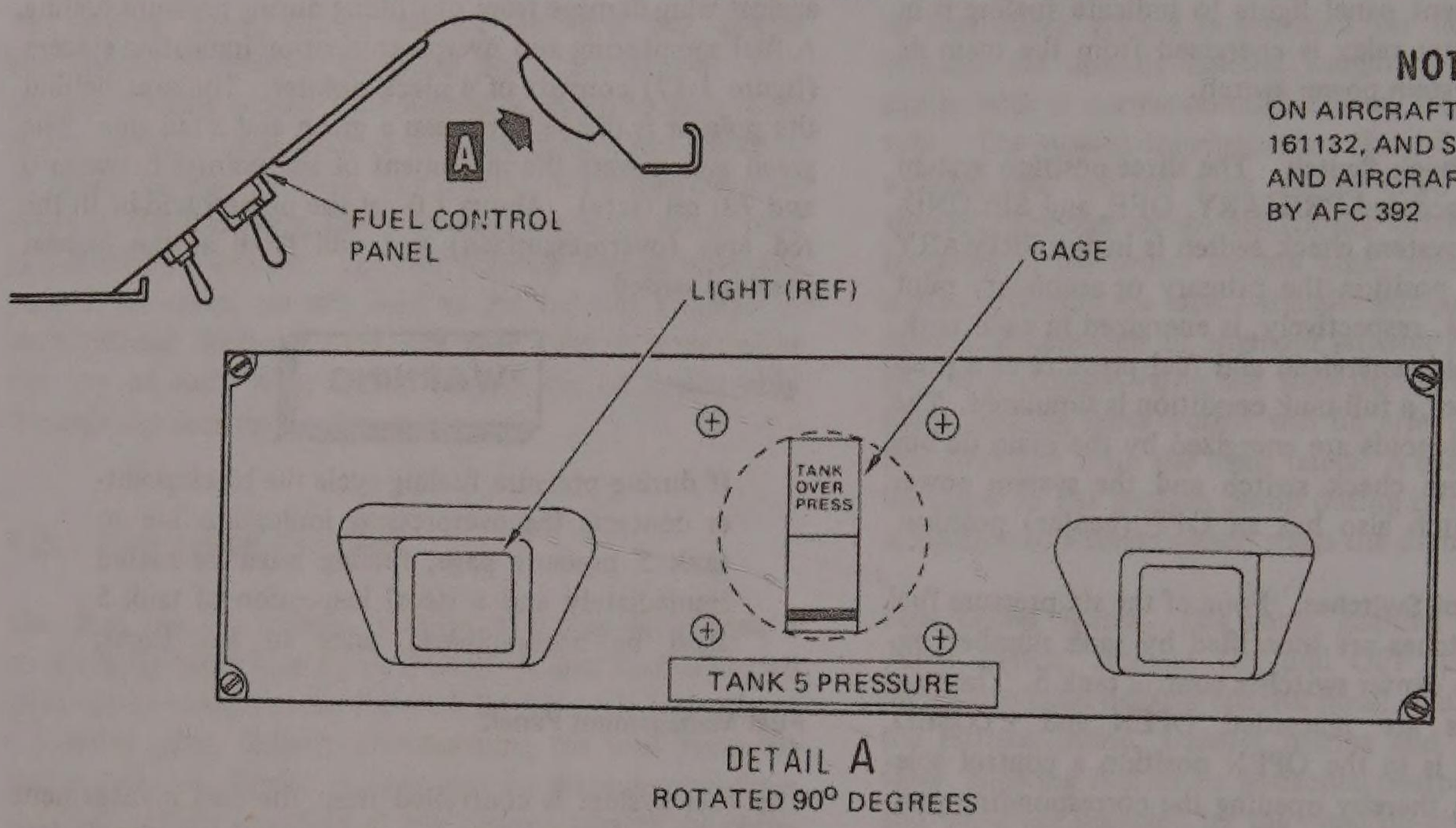


Figure 1-17. Air Vent Pressure Gage

NEW

the tank 5 transfer pumps. They are green and are energized from the monitorable essential dc bus through a light-dimming circuit and the pressure switches.

Main Fuel Tank Valve Switches. Four switches, placarded MAIN TANK VALVE, are provided to control each main tank valve. The switch positions are OPEN and CLOSED. Placing a switch in the CLOSED position closes a main tank valve and shuts off the corresponding tank from the engine and the crossfeed manifold. The valve motor is energized from the monitorable essential ac bus, receiving power through the main tank valve switch and a limit switch on the motor.

Main Fuel Tank Valve Open Lights. Four lights that read TANK, are associated with each main tank valve. They light green whenever the corresponding main tank valve position does not coincide with the main tank valve switch position. Failure of a tank valve to open or close completely causes the associated light to remain lighted. They are energized from the monitorable essential dc bus, receive power through a light-dimming circuit, main tank valve switches, and limit switches.

Fuel Crossfeed Valve Switches. Five switches, one labeled CROSSFEED and four labeled CROSSFEED VALVE, control the crossfeed valves. The switch labeled CROSSFEED controls the valve in the crossfeed line between the right and left wing tanks. The switch positions are OPEN and CLOSED. Operating a switch to a placarded position causes the corresponding crossfeed valve to open or close. The motors that operate the crossfeed valves are energized from the monitorable essential ac bus and receive power through the crossfeed valve switches and the limit switches on the motors.

Fuel Crossfeed Valve Open Lights. The crossfeed valve lighted indicators are placarded XFEED and light green whenever the corresponding valve position does not coincide with the crossfeed valve switch position. Failure of a crossfeed valve to open or close completely causes the associated indicator to remain lighted. The indicators are energized from the monitorable essential dc bus, receiving power through a light-dimming circuit, the crossfeed valve switches, and the limit switch.

Fuel Low Pressure Lights. Four indicators, one for each engine and placarded PRESS LOW, are provided to warn of a low differential pressure across the corresponding engine-driven boost pump. The indicators light yellow. Before starting, the light will be on but should go out during the start and remain out during all normal engine operation, indicating operation of the engine-driven boost pump. The indicators are powered from the monitorable essential dc bus through a light-dimming circuit and a pressure switch.

Fuel Filter Bypass Lights. Four indicators, one for each engine, are placarded FILTER and, when lighted, indicate that fuel is bypassing the low pressure filters. The indicators are powered from the monitorable essential dc bus through a light-dimming circuit and a pressure switch.

Fuel Transfer Control Reset Light. An indicator in the center of the panel, placarded RESET, lights green whenever the refuel control panel has control of the pressure fueling valves and the fuel management panel does not. The indicator receives power from the monitorable essential dc bus through a light-dimming circuit and the contact of the energized master relay.

Fuel Transfer Control Switch. A spring-loaded pushbutton on the panel, placarded FUEL TRANSFER CONTROL, is provided to ensure that the fuel management panel has control of the pressure fueling valves. When the pushbutton is pressed, the holding coil of the master relay is deenergized, which returns control of the pressure fueling valves to the fuel management panel. The holding coil is energized from the main dc bus through the system power switch (on the fueling panel) and the fuel transfer control switch.

Fuel Crossfeed Pressure Gage. A fuel crossfeed pressure gage, calibrated 0-50 psi, is provided to indicate pressure in the fuel crossfeed manifold. This permits checking the crossfeed system for correct operation and is the only way of checking boost pump pressure. The gage receives power from the 26-volt ac instrument transformer. Due to thermal expansion, the gage may indicate up to 50 psi with valves closed.

Total Fuel Quantity Gage. A gage, indicating total fuel in pounds, is located in the center of the panel. This gage receives power from the monitorable essential ac bus.

Fuel Tank Quantity Gages. Five fuel quantity gages indicate fuel quantity in the separate tanks. The gages for the four wing tanks are marked 0-12 x 1000 pounds, and the tank 5 gage is marked 0-18 x 1000 pounds. They are powered by the monitorable essential ac bus.

Fuel Quantity Gage Test Switch. A spring-loaded pushbutton switch, placarded FUEL GAUGE TEST, is provided to test correct operation of the gages on the panel. Pressing the switch causes a test relay to be energized which drives the pointers of properly operating gages toward zero. The test relay is energized from the main dc bus extension, receiving power through the gage test switch.

Fuel Tank 5 Sight Gage. On-ground fuel quantity measurement of the tank 5 is possible through use of a sight gage provided in the center section of the tank. Located on the fuselage under a cover plate and abeam of the main landing gear, fuel quantity in the tank is checked on a slip-tube assembly utilizing a principle of reflected light absorption acting on a viewing plate. The gage can be unlocked from its stowage position by rotating it counterclockwise.

Hydrostatic Fuel Quantity Gage and Water Drain Fixture. (See figure 1-18). The hydrostatic fuel gage is stowed in a case located on the inboard side of the left wheelwell. The gage is used to drain water from the fuel tanks sumps and as a go/no-go (dipstick) device to check for gross malfunctions of the wing tank fuel quantity indicating system. The gage dial is calibrated in pounds for fuel in the specific gravity range of JP-5, although it may be used with JP-4 and JP-8 fuel. Accuracy of the fuel readings is affected by level of the aircraft, with roll having a greater effect than pitch. The quantity gage calibration is based on the aircraft being in a nominal position of 0 degree roll and 1 degree nose-down pitch. An inclinometer, oriented to indicate roll attitude, is located at the under-wing fueling station. Refer to NAVAIR 01-75PAC-2-4 for gage operating instructions.

ELECTRICAL POWER SUPPLY SYSTEM.

The electrical power supply system provides the necessary ac and dc power for aircraft requirements. (See figures 1-19 through 1-23 and FO-7.) Aircraft ac power is supplied by three 60 KVA engine-driven generators. An additional generator is driven by the APU. One inverter is provided. It supplies emergency ac power to operate the turbine inlet temperature indicators. The dc power requirements for normal operation are supplied by three transformer rectifiers. A 24 volt, 31 amp hour battery supplies power for the flight essential dc bus and to operate the ac inverter. Also, this battery supplies power through the flight essential dc bus to the ground operation dc bus and the APU essential dc bus.

AC POWER SUPPLY.

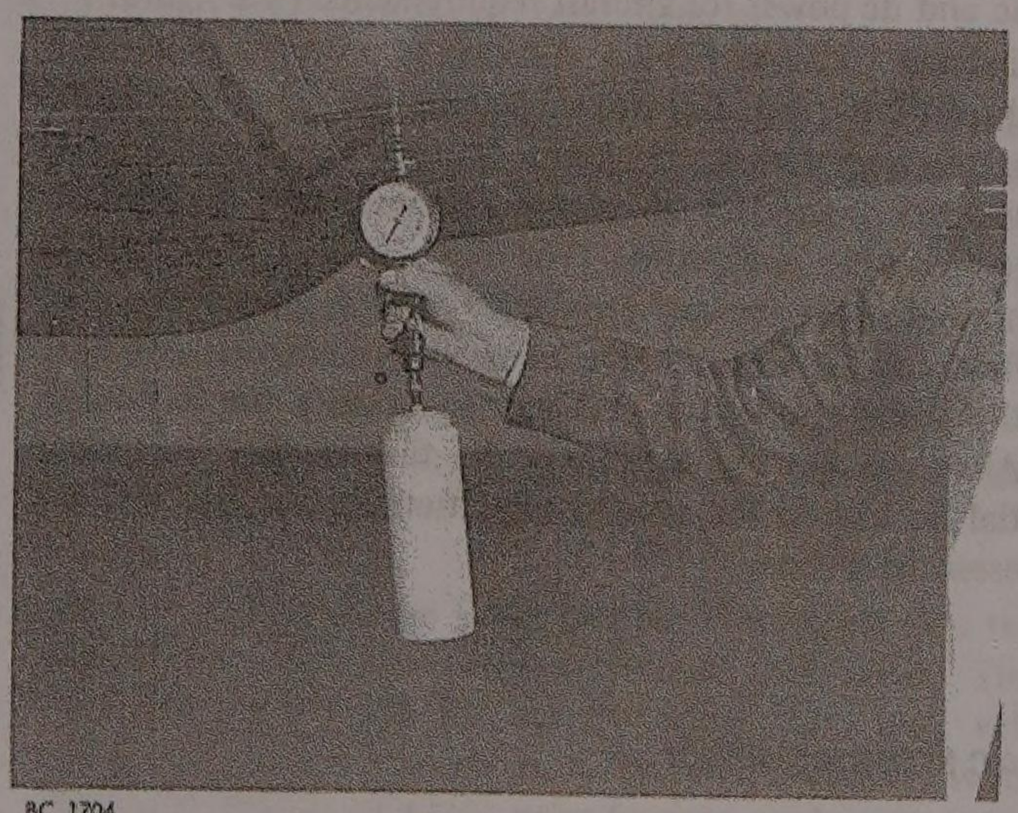
Generators No. 2, 3, and 4 are mounted on and driven by engines No. 2, 3, and 4 respectively. Generator output is 120/208 volts ac. The frequency of the output voltage is 360/430 Hz when the engine is operating in normal rpm.

Each generator contains two primary support bearings, the drive end bearing and a rear bearing. In addition, an auxiliary bearing is installed adjacent to the drive end bearing.

HYDROSTATIC FUEL QUANTITY GAGE

BC 1703

STOWED POSITION (PORT WHEEL WELL)



BC 1704

OPERATION (UNDER WING)

Figure 1-18. Hydrostatic Fuel Quantity Gage

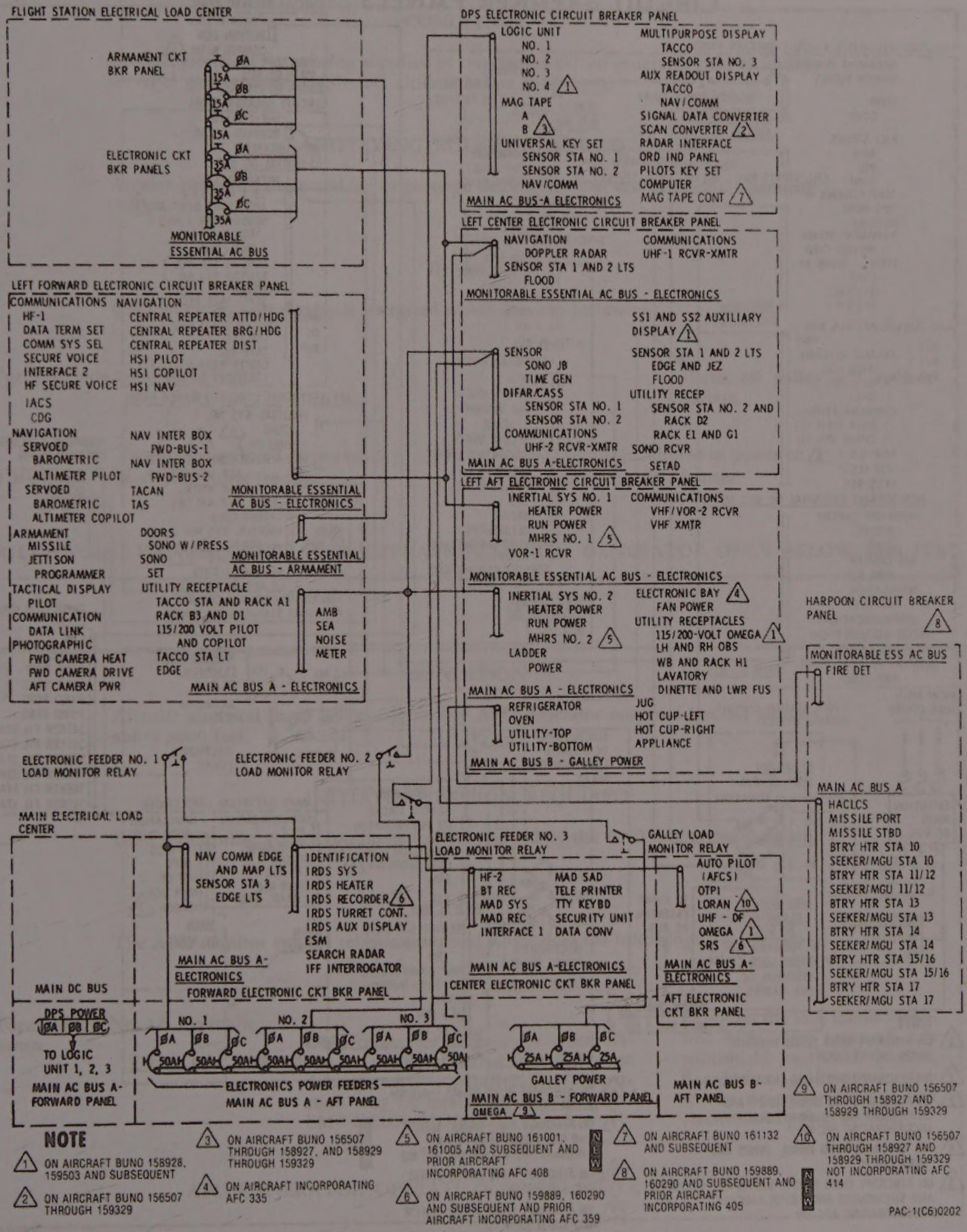
The purpose of the auxiliary bearing is to assume the generator drive shaft load in the event of a failure of the drive end bearing. The generator mechanical failure light is designed to illuminate whenever the auxiliary bearing is under a load. However, an unresettable GEN OFF light may be indicative of various internal generator mechanical failures, including a drive end bearing failure. In the event of generator seizure, the generator drive shaft has a shear section to prevent damage to the gear reduction section. NEW NEW NEW NEW

AC power is distributed throughout the aircraft by the following buses: main ac bus A, main ac bus B, monitorable essential ac bus, flight essential ac bus and start essential ac bus. Each generator is controlled from the right inboard overhead electrical control panel. During ground operation the main ac bus A and main ac bus B are energized by external power until external power is turned off. The main ac bus A is automatically transferred to generator No. 2 after the generator reaches rated output voltage and frequency. The main ac bus B is automatically transferred to generator No. 3 after this generator reaches rated output voltage and frequency. Generator No. 4 runs unloaded as a standby during normal operation after generators No. 2 and No. 3 have attained rated voltage and frequency. Failure or turning off of either generator No. 2 or No. 3 will automatically transfer the main ac bus A or main ac bus B, as applicable, to standby generator No. 4.

Generators No. 2, 4, or 3 energize the flight essential ac bus thru runaround relays. If the runaround feeder circuits fail the main ac bus A energizes the flight essential ac bus. The main ac bus A normally energizes the monitorable essential ac bus. If the main ac bus A fails or is disconnected the monitorable essentical ac bus is energized through the runaround relay and the monitoring relay. If two generators fail or are disconnected, the main ac bus A and main ac bus B automatically transfer to the remaining generator. The generators are protected by the automatic bus transfer system which disconnects a generator from its normal load if over or under-frequency, over or under-voltage, or feeder line faults exist. New production supervisory panels which are the preferred replacement do not provide overfrequency protection. NEW

During single engine-driven generator operation, the electrical system is monitored whenever the propeller deice switch or empennage deice monitor switch are placed in the ON position. Actuation of either or both switches causes the electronic ac and dc power feeders, galley power radiant heaters and side windshield defogging to automatically disconnect.

AC POWER SUPPLY FOR ELECTRONIC CIRCUIT BREAKER PANELS



NOTE

(1) ON AIRCRAFT BUNO 158928, 159503 AND SUBSEQUENT

(2) ON AIRCRAFT BUNO 156507 THROUGH 159329

(3) ON AIRCRAFT BUNO 156507 THROUGH 158927, AND 158929 THROUGH 159329

(4) ON AIRCRAFT INCORPORATING AFC 335

(5) ON AIRCRAFT BUNO 161001, 161005 AND SUBSEQUENT AND PRIOR AIRCRAFT INCORPORATING AFC 408 (NEW)

(6) ON AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT AND PRIOR AIRCRAFT INCORPORATING AFC 359

(7) ON AIRCRAFT BUNO 161132 AND SUBSEQUENT

(8) ON AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT AND PRIOR AIRCRAFT INCORPORATING 405 (NEW)

(9) ON AIRCRAFT BUNO 156507 THROUGH 158927 AND 158929 THROUGH 159329

(10) ON AIRCRAFT BUNO 156507 THROUGH 158927 AND 158929 THROUGH 159329 NOT INCORPORATING AFC 414 (NEW)

PAC-1(C6)0202

Figure 1-19. AC Power Supply for Electronic Circuit Breaker Panels

DC POWER SUPPLY FOR ELECTRONIC CIRCUIT BREAKER PANELS

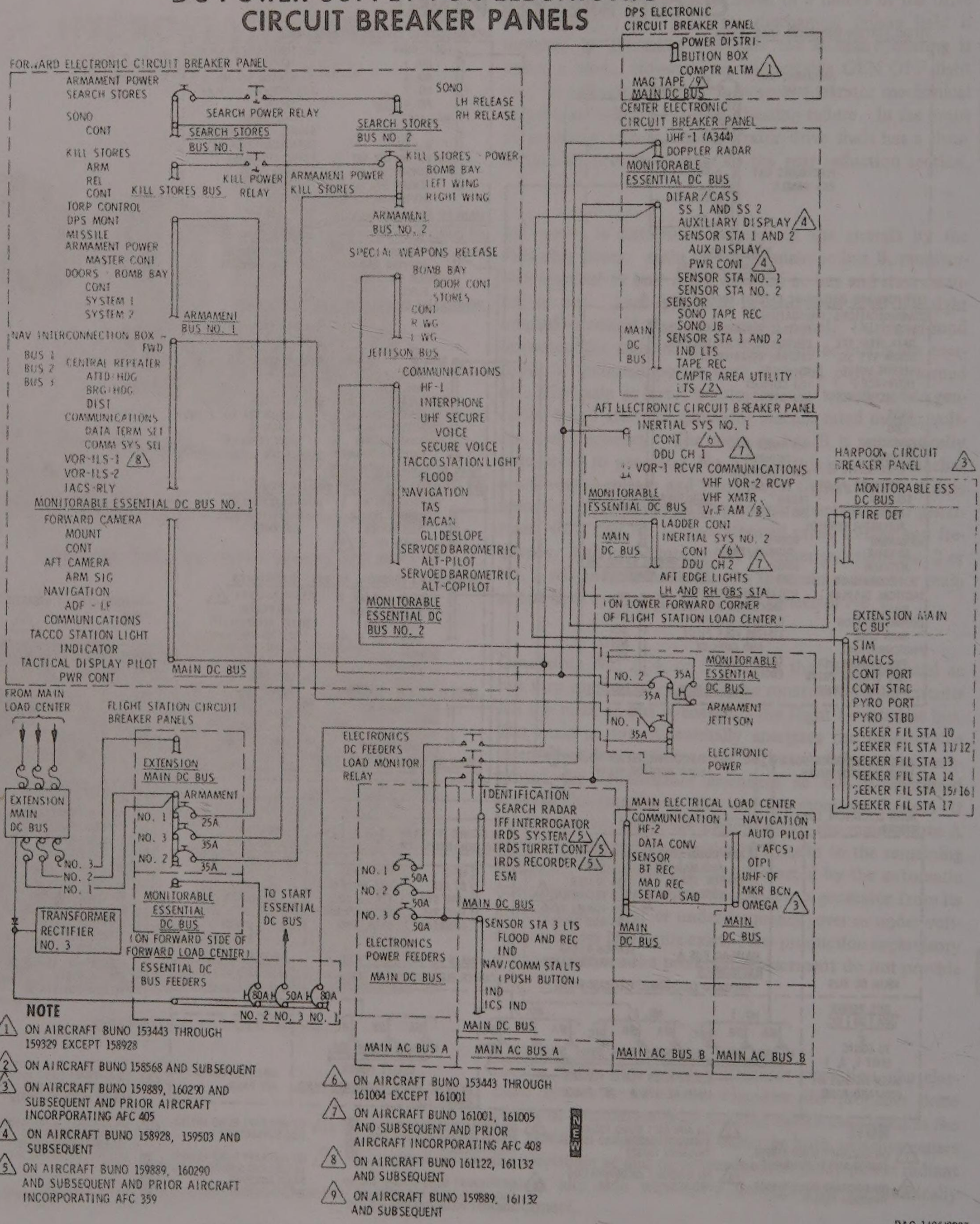


Figure 1-20. DC Power Supply for Electronic Circuit Breaker Panels

LOAD MONITORING SYSTEM FUNCTIONAL BLOCK DIAGRAM

CONDITION

Aircraft electrical buses being supplied by one engine-driven generator (any altitude), or APU generator only (aircraft altitude below 8000 feet).

↓

INITIATING ACTION REQUIRED

Actuate propeller deice and/or empennage deice systems in test or normal operating modes.

↓

RESULT

Load monitor control relay is energized which does the following:

- Turns off side windshield heat.
- Turns off monitored dc power on electronic power feeders.
- Turns off monitored ac power on electronic power feeders.
- Turns off galley and radiant heaters.

SINGLE ENGINE-DRIVEN GENERATOR OPERATION OR APU GENERATOR ONLY BELOW 8000 FEET

NEW

CONDITION

Aircraft electrical buses being supplied by APU generator only and aircraft altitude above 8000 feet.

↓

INITIATING ACTION REQUIRED

Load monitoring system is automatically triggered by the 8000 feet pressure switch.

↓

RESULT

The APU monitor control relay is energized which does the following:

- Turns off the No. 1A hydraulic pump.
- Deenergizes the empennage deice system control relay so that the empennage deice system is inoperative. System operation may be established by using the EMP DEICE MONITOR switch.
- Energizes the load monitor control relay which turns off side windshield heat, wall heaters, floor heaters, galley power, electronics dc power feeders, and electronic ac power feeders.

APU GENERATOR OPERATION ONLY ABOVE 8000 FEET

Figure 1-21. Load-Monitoring System Functional Block Diagram

AC BUS DISTRIBUTION

MONITORABLE ESSENTIAL AC BUS

AIR CONDITION INSTRUMENTATION
AIR FOIL TEMP AND HEAT CAUTION
ARA-50 AMPLIFIER
ARA-25A/48 ANTENNA
AUX VENT ACTUATOR
EMPENNAGE DEICING TIMER MOTOR
FLT STATION AND CABIN TEMP CONTROL AND INDICATOR
FUEL CROSSFEED CONTROL
FUEL TANK SHUTOFF VALVE CONTROL
FUEL QUANTITY INDICATORS (FLIGHT STATION)
ICE DETECTOR
RED EDGE AND POST LIGHTS FOR OVERHEAD, INSTRUMENT, AND PEDESTAL PANELS
LANDING LIGHTS
(1) F.D.I. (PILOT AND COPILOT)
NESA WINDSHIELD
OIL COOLER FLAP CONTROL
TEMPERATURE DATUM CONTROL
TORQUEMETER
(1) VERTICAL (STANDBY) GYRO
WINDSHIELD WASHER PUMP
26 VOLT INSTRUMENT TRANSFORMER NO. 1 AND NO. 2
(1) PILOT AND COPILOT RED INST LTS
WINDSHIELD WIPERS
(10) XMFR RECT NO. 3
ALTM VIB NAV
ESS LTG & IND CONTROL
HSI MODE LIGHTS
FLT DIR PWR

28V AC FWD LIGHTING XFMR

C/B PNL RED EDGE
DOME AND FLT CAPT READING
RH PITOT HTR
STEP LIGHT
SEXTANT
ROCKET SIGHT
TAXI LIGHTS
WHEEL WELL LIGHTS
WING AND TAIL LIGHTS

ELECTRONICS

DOPPLER NAVIGATION RADAR
UHF-1 TRANSCEIVER
VHF VOR-2 RECEIVER
VHF XMTR
HF-1 TRANSCEIVER
INS 1
RAWS (1 AND 2)
VOR-1 NAVIGATION RECEIVER
CENTRAL REPEATER SYS
HSI CONTROL (PILOT, COPILOT, AND NAV/COMM)
NAV INTERCONNECTION BOX (BUS 1 AND 2)
TACAN
TAS
DATA LINK (DATA TERMINAL SET)
COMM INTERFACE 2
COMM SYS SEL
HF SECURE VOICE
SECURE VOICE (SECURE SWITCHING MATRIX)
(4) BARO ALTIMETERS ENCODER (PILOT AND COPILOT)
ELECTRONIC BAY FAN POWER

ARMAMENT

MISSILE AN/ARW-77
JETTISON PROGRAMMER
DOORS (SONO WITH PRESS)
SONO SET

26 VOLT INSTRUMENT TRANSFORMER NO. 1

BLEED AIR MANIFOLD PRESSURE INDICATOR
FLAP POSITION INDICATOR
HYDRAULIC PRESSURE INDICATOR SYSTEM NO. 1
LEFT EDC AIR PRESSURE INDICATOR
NORMAL BRAKE PRESSURE INDICATOR
OIL COOLER FLAP POSITION INDICATOR (ENGINE 1 AND ENGINE 4)
OIL PRESSURE INDICATOR (ENGINE 1 AND ENGINE 4)

26 VOLT INSTRUMENT TRANSFORMER NO. 2

EMERGENCY BRAKE PRESSURE INDICATOR
FUEL CROSSFEED MANIFOLD PRESSURE INDICATOR
HYDRAULIC PRESSURE INDICATOR SYSTEM NO. 2
OIL COOLER FLAP POSITION INDICATOR (ENGINE 2 AND ENGINE 3)
OIL PRESSURE INDICATOR (ENGINE 2 AND ENGINE 3)
RIGHT EDC AIR PRESSURE INDICATOR

START ESSENTIAL AC BUS

TURBINE INLET TEMPERATURE

MAIN AC BUS A

(3) EMPENNAGE DEICING (PARTING STRIPS)
FEATHER PUMP (ENG NO. 1 AND NO. 4 ALT)
FEATHER PUMP (ENG NO. 2 AND NO. 3)
FORWARD FUEL TRANSFER PUMP
XFMR RECT NO. 1
FUEL BOOST PUMP NO. 1 AND 3
FUEL DUMP JETTISON PUMP
FUEL FLOW INDICATOR
FUEL QUANTITY INDICATOR (FUELING PANEL)
HYDRAULIC PUMP NO. 1
OVERHEAD LIGHTS
PROPELLER SYNC
(2) (5) (5) SIDE WINDSHIELD HEAT POWER
OMEGA
SENSOR STATION 1 AND 2 AUXILIARY DISPLAY

(2) ELECTRONICS NO. 1 FEEDER

(10) CREW LIGHTING (NAV/COMM & SS3)
LORAN RECEIVER
IFF INTERROGATOR
HF-2 TRANSCEIVER
ESM
TTY SECURITY UNIT
ON TOP POSITION INDICATOR (OTPI)
AUTOMATIC PILOT SYSTEM
COMM INTERFACE 1
TTY KEYBOARD
TTY PRINTER
TTY CONVERTER
UTILITY OUTLETS
SEARCH RADAR
(7) SONO REF SYS
MAD/SAD
BT RECORDER
(7) IRDS

(2) ELECTRONICS NO. 2 FEEDER

PILOT'S DISPLAY
DATA LINK
FWD CAMERA
AFT CAMERA
INS-2
LADDER
TIME CODE GEN
DIFAR 1 AND 2
UHF-2
SONOBUOY RECEIVERS
UTILITY RECEPTACLES
SONO JB
SS1 & 2 LIGHTING
(12) EDGE LIGHTING (TACCO STATION)
HACLCS

(2) ELECTRONICS NO. 3 FEEDER

(5) LOGIC UNITS (1, 2 AND 3)
LOGIC UNIT 4
MAG TAPE TRANSPORTS
UNIVERSAL KEYSETS
MULTIPURPOSE DISPLAYS
AUX READOUTS
(6) SIGNAL DATA CONVERTER
SCAN CONVERTER
ORD IND PANEL
PILOT KEYSET LIGHTS
COMPUTER
RADAR INTERFACE
(11) IACS CDG
MAG TAPE CONT

FLIGHT ESSENTIAL AC BUS

RADAR ALTIMETER POWER
IFF TRANSPONDER PWR
(1) ATTD IND, VERT GYRO
(1) LH PITOT HEATER
(1) FDI (PILOT AND COPILOT)
OUTFLOW VALVE OVERRIDE
(1) PILOT AND COPILOT RED INST LTS
ATTD IND, GYRO HORIZON
GYRO HORIZON (STANDBY)

MAIN AC BUS B

AFT FUEL TRANSFER PUMP
CABIN EXHAUST FAN
(3) (2) EMPENNAGE DEICING (CYCLE POWER)
FEATHER PUMPS (ENG. NO. 1 AND 4)
FLOOR HEATERS
HEAT EXCHANGER FANS
(2) FUEL BOOST PUMP NO. 2 AND NO. 4
GALLEY POWER
HYDRAULIC PUMP NO. 1A AND NO. 2
PROPELLER ICE POWER AND TEST
(2) SERVICE OUTLETS
WALL HEATERS
XMFR RECT NO. 2
(13) OMEGA

NEW

AFT LIGHT TRANSFORMER

BOMB BAY, LAV AND GALLEY LIGHTS
(8) (9) SERVICE AND CIRCUIT BREAKER PANEL LIGHTS
28V AC LIGHTING BUS ROTATING BEACONS
STROBE LIGHTS ØB

NOTE

(1) POWERED BY FLIGHT ESSENTIAL AC BUS IF MONITORABLE ESSENTIAL AC BUS BECOMES DEENERGIZED. IF MONITORABLE ESSENTIAL DC BUS BECOMES DEENERGIZED, VERTICAL GYRO ATTITUDE INFORMATION IS DISPLAYED ON PILOT AND COPILOT FDI'S REGARDLESS OF POSITION OF ATTD SELECT SWITCHES

(2) WITH EMPENNAGE AND OR PROPELLER ICE CONTROL SYSTEMS ENERGIZED AND ONLY ONE GENERATOR OPERATING, THE MAIN AC BUS A AND MAIN DC ELECTRONIC FEEDERS, FLOOR AND WALL HEATERS, SIDE WINDSHIELD DEFOG AND GALLEY POWER ARE AUTOMATICALLY DISCONNECTED. ABOVE 8000 FEET ALTITUDE, ADDITIONAL MONITORING OF NO. 1A HYDRAULIC PUMP AND EMPENNAGE DEICING IS PROVIDED WHEN THE APU GENERATOR IS THE ONLY POWER SOURCE AVAILABLE

(3) CAN BE POWERED BY MAIN AC BUS A BY POSITIONING FEATHER TRANSFER SWITCH

(4) ON AIRCRAFT INCORPORATING AFC 335

(5) INSTALLED ON AIRCRAFT BUNO 158928, 159503 AND SUBSEQUENT

(6) ON AIRCRAFT BUNO 156507 THROUGH 159329

(7) ON AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT AND PRIOR AIRCRAFT INCORPORATING AFC 359

(8) ON AIRCRAFT BUNO 15443 THROUGH 159875 NOT INCORPORATING AFC 314

(9) ON AIRCRAFT BUNO 153443 THROUGH 159875 INCORPORATING AFC 314 AND AIRCRAFT BUNO 159883 AND SUBSEQUENT

(10) ON AIRCRAFT BUNO 153443 THROUGH 159329 EXCEPT 158928 NOT INCORPORATING AFC 414 NEW

(11) ON AIRCRAFT BUNO 161132 AND SUBSEQUENT

(12) ON AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT AND PRIOR AIRCRAFT INCORPORATING AFC 405 NEW

(13) ON AIRCRAFT BUNO 156507 THROUGH 158927 AND 158929 THROUGH 159329 NEW

PAC-1(C6)0049

Figure 1-22. AC Bus Distribution

DC BUS DISTRIBUTION

MONITORABLE ESSENTIAL DC BUS

AMAC POWER AND CONTROL
AIR CONDITIONING BLOWER CONTROL (L AND R)
ANGLE OF ATTACK
AIR MULTIPLIER VALVE
APU ESSENTIAL BUS FEEDER
AUX VENT
BOMB RACK LOCK POWER
BUS A AND BUS B CONTROLS
COMPASS LIGHT
CONSOLE (PILOT, COPILOT RED EDGE)
CRASH LOCATOR
EDC DISCONNECT L AND R
EDC DUMP L AND R
EMER ENGINE SHUTDOWN CONTROL 1, 2, 3, 4
ENGINE ICE CONTROL
FIRE DETECTORS
FIRE DETECTOR HORN
FIRE EXTINGUISHER SYSTEM
FLIGHT IDLE STOPS
GENERATOR 2, 3, AND 4 CONTROLS
GENERATOR 4 TRANSFER
HYDRAULIC PUMP NO. 1A CONTROL
NESA WINDSHIELD L AND R
OIL TANK SHUTOFF VALVE CONTROL
POWER SENSING
PROP FEATHER CONTROLS NO. 1 AND NO. 4
RUDDER BOOST SHUTOFF VALVE
WARNING LIGHTS (RED)
IFF TRANSPONDER CONTROL PWR
IFF TEST SET
SIGNAL LIGHTS
△4 TURN RATE GYRO (PILOT AND COPILOT)
RAWS (1 AND 2 TEST)
ICS AND LIGHTS (PILOT, COPILOT)
FLIGHT DIRECTOR

ELECTRONIC PWR NO. 1

COMM SYS SEL
NAV INTER BOX
CENTRAL REPEATER SYS
DATA LINK (DATA TERMINAL SET)
VOR-ILS-1
△10 VOR-ILS-2
VHF-AM

ELECTRONIC PWR NO. 2

TACCO STA FLOOD LIGHTS
TAS
HF-1
TACAN
VHF/VOR-2 RECEIVER
VHF XMTR
VOR-1 RECEIVER
INTERPHONE
DOPPLER RADAR
UHF-1 (A344)
UHF SECURE VOICE
SECURE VOICE (SECURE SWITCHING MATRIX)
INS-1
△3 ALTIMETER VIB - (PILOT AND COPILOT)
BARO ALTM NAV

ARMAMENT JETTISON

BOMB BAY DOOR CONT
BOMB BAY STORES
JETTISON CONTROL
LEFT WING JETTISON
RIGHT WING JETTISON
SPECIAL WEAPONS RELEASE

APU ESSENTIAL DC BUS

DOOR POS LIGHT
EXH DOOR ACT.
FIRE DET. HORN
FIRE EXTINGUISHER
--AUTO CONTROL
--AUTO RELEASE
--MANUAL CONTROL
--MANUAL RELEASE
INTAKE DOOR ACTUATOR

START ESSENTIAL DC BUS

PRIMER CONTROL
FUEL AND IGNITION CONTROL
START CONTROL
FUEL SHUTOFF VALVES
TEMP DATUM CONTROL
BLEED AIR FIREWALL SHUTOFF VALVES
FUSELAGE BLEED AIR ISOLATION VALVES
INVERTER POWER

GROUND OPERATION DC BUS

APU CONTROLS
EXTERNAL POWER
HYDRAULIC PUMP CONTROL NO. 1B
HYDRAULIC PUMP POWER NO. 1B
OIL QUANTITY INDICATORS

FLIGHT ESSENTIAL DC BUS

IFF EMERGENCY CONTROL/ZERO POWER
COMMAND BELL
FLIGHT STATION UTILITY LIGHTS
GEN 4 AUX CONT
GRND OPER BUS RELAY
INVERTER RELAY
PROPELLER PITCHLOCK RESET
△4 TURN RATE GYRO (PILOT)
SECURE VOICE ZERO

MAIN DC BUS

RACK OVERHEAT
BOMB BAY HEAT CONTROL
CABIN EXHAUST FAN CONTROL
COUNTING ACCEL
DUCT OVERHEAT TEST
△1 EMPENNAGE DEICING CONTROL
EXTERIOR LIGHTS
FIRE EXTINGUISHER CONTROL (ALT.)
FREE AIR TEMPERATURE INDICATION
FUEL BOOST AND TRANSFER PUMPS CONTROL
FUEL DUMP SWITCH AND DUMP VALVE
FUEL INLET VALVES AND REFUEL CONTROL
FUEL QUANTITY SYS TEST
GROUND AIR SENSING
HYDRAULIC FLUID QUANTITY
HYDRAULIC PUMP CONTROL NO. 1 AND NO. 2
LANDING GEAR CONTROL
LANDING GEAR INDICATION AND WARNING
L AND R FLAP BK
LATCH AND RELEASE
△1 LOAD MONITORING CONTROL
LOAD MONITORING RELAYS
LOW RPM SOLENOID
NEGATIVE TORQUE SYSTEM CHECK
OIL QUANTITY AND TEMP INDICATORS
△3 OMEGA
PROPELLER AND WING ICE CONTROL
PROPELLER AUTOFEATHER
PROP FEATHER CONTROLS NO. 2 AND NO. 3
PILOTS DISPLAY CONTROL
PROP SYNC CONTROL
UTILITY RECEPTACLES
△3 SENSOR STATION 1 AND 2 AUXILARY DISPLAY
SENSOR 1 AND 2 AUX DISPLAY PWR CONT
△1 SIDE WINDSHIELD HEAT CONTROL
△6 ROTATING BEACONS
△7 STROBE LIGHTS

ARMAMENT

ARMAMENT POWER
BOMB BAY DOORS
KILL STORES
KILL POWER RELAY
SEARCH STORES
SEARCH POWER RELAY
TORPEDO
SONO RELEASE LH & RH
KILL STORES POWER (LW, RW, AND BOMB BAY)
△5 HACLCS

△1 MAIN DC ELECTRONIC FEEDER NO. 1

FWD CAMERA
AFT CAMERA
ADF
TACCO STA LIGHT IND
TACTICAL DISPLAY PILOT
DPS PWR DIST BOX
COMPUTER ALT
IACS-RLY
△9 MAG TAPE

△1 MAIN DC ELECTRONIC FEEDER NO. 2

DIFAR/CASS
SS1 AND 2 LIGHTS
SONO TAPE RECORDER
SONO JUNCTION BOX

△1 MAIN DC ELECTRONIC FEEDER NO. 3

LADDER CONTROL
INS-2
EDGE LIGHTS LH & RH OBS STA
SEARCH RADAR
ESM
IFF INTERROGATOR
HF-2
BIT RECORDER
MAD
SAD
AUTOPILOT
OTPI
UHF DF
MKR BEACON
SS-3 LIGHTS
NAV/COMM LIGHTS
UHF-2
TTY CONVERTER
△8 IRDS

NOTE

△1 WITH EMPENNAGE AND/OR PROPELLER ICE CONTROL SYSTEMS ENERGIZED AND ONLY ONE GENERATOR OPERATING, THE MAIN AC BUS A AND MAIN DC ELECTRONIC FEEDERS, FLOOR AND WALL HEATERS, SIDE WINDSHIELD DEFOG AND GALLEY POWER ARE AUTOMATICALLY DISCONNECTED. ABOVE 8000 FEET ALTITUDE, ADDITIONAL MONITORING OF NO. 1A HYDRAULIC PUMP AND EMPENNAGE DEICING IS PROVIDED WHEN THE APU GENERATOR IS THE ONLY POWER SOURCE AVAILABLE

△2 ON AIRCRAFT BUNO 159323, 159503 AND SUBSEQUENT

△3 INSTALLED ON AIRCRAFT BUNO 158928, 159503 AND SUBSEQUENT

△4 PILOTS TURN RATE GYRO POWERED BY FLIGHT ESSENTIAL DC BUS WITH THE ESSENTIAL BUS SWITCH IN THE OFF POSITION

NEW △5 ON AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT AND PRIOR AIRCRAFT INCORPORATING AFC 405

△6 ON AIRCRAFT BUNO 153443 THROUGH 159875 NOT INCORPORATING AFC 314

△7 ON AIRCRAFT BUNO 153443 THROUGH 159875 INCORPORATING AFC 314 AND AIRCRAFT BUNO 159883 AND SUBSEQUENT

△8 ON AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT AND PRIOR AIRCRAFT INCORPORATING AFC 359

△9 ON AIRCRAFT BUNO 159889, 161132 AND SUBSEQUENT

△10 ON AIRCRAFT BUNO 161122, 161132 AND SUBSEQUENT

PAC-1(C6)0050

Figure 1-23. DC Bus Distribution

ELECTRICAL POWER CONTROL PANEL

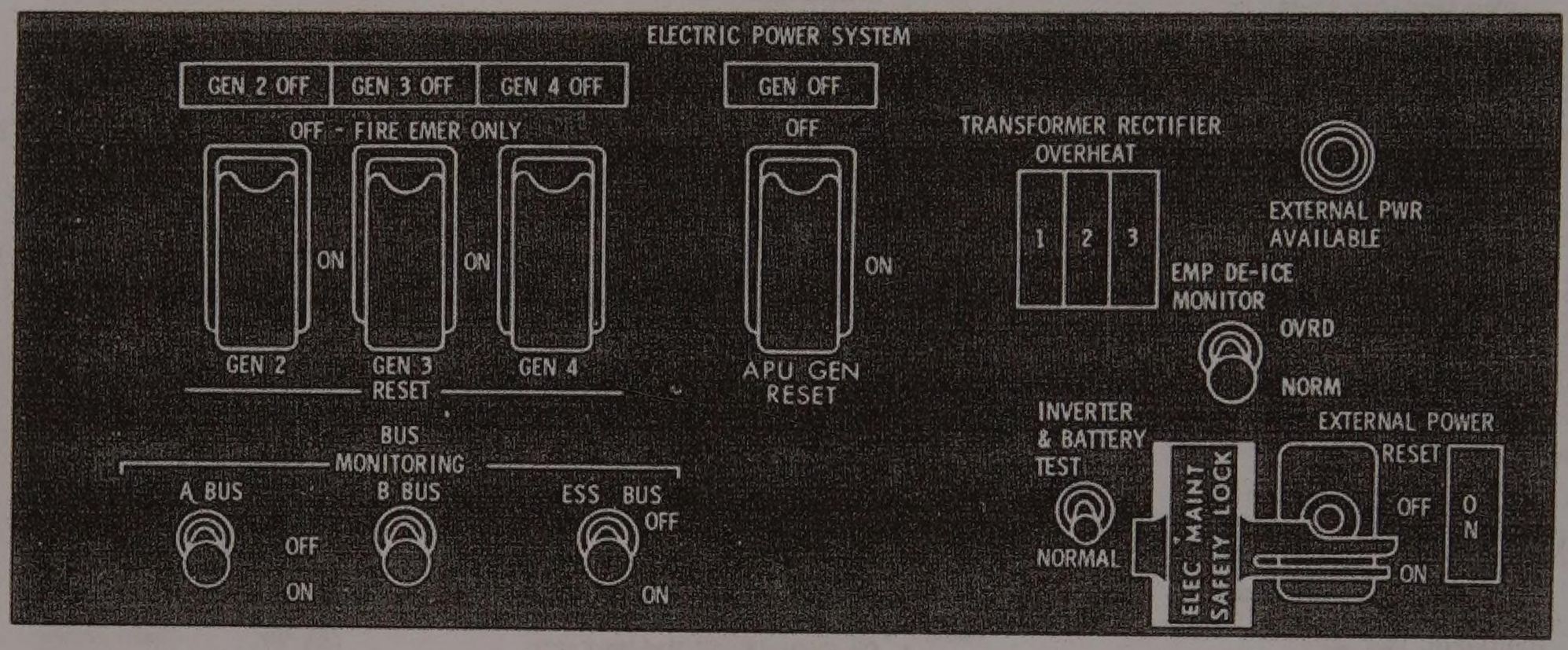


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Figure 1-24. Electrical Power Control Panel

External Power Supply.

A receptacle for connecting an external ac power source to all the aircraft ac buses is located under the right wing, in the wing fillet area. An external power ON/OFF/RESET switch is located on the overhead electrical panel (figure 1-24). EXTERNAL POWER AVAILABLE and EXTERNAL POWER ON lights are also located on the overhead electrical panel. Another EXTERNAL POWER ON indicator light is located adjacent to the external power receptacle. An external power monitor relay protects the aircraft buses from irregularities in phase, voltage and frequency that may occur in the ground power supply. When transferring from the aircraft power system to ground power, it may be necessary to place the external power ON/OFF/RESET switch momentarily to the reset position, before the aircraft buses will accept ground power.

APU Power Supply.

The APU provides a 60 KVA source of ac electrical power that may be utilized in flight or on the ground. The APU when operating is capable of assuming electrical loads during malfunction of the main engine-driven generators. The No. 4 generator takes priority and the APU is held on the line as a standby generator during single generator operation. The electronic ac and dc feeders galley power and radiant heaters, side windshield defogging are monitored when the propeller and/or empennage ice control systems are activated below 8000 feet and the APU is the only generator available. When the APU is the only generator available and the aircraft ascends through 8000 feet altitude, complete automatic monitoring occurs through a pressure switch, permitting the APU generator to operate within prescribed limits by dropping out the previously monitored loads and additional loads through the APU load monitor relay. The additional loads dropped include empennage deice system, and the No. 1A hydraulic pump. Refer to Electrical System Failures, Section V, Part 2, NAVAIR 01-75PAC-1.

DC POWER SUPPLY.

Three 200-ampere, 27-volt transformer-rectifiers furnish the dc power required for aircraft operation and battery

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST

CIRCUIT BREAKER PANEL LOCATION CODE	
A	FORWARD LOAD CENTER (FWD-AFT).
B	FORWARD LOAD CENTER (LOWER).
C	MAIN LOAD CENTER.
D	FORWARD ELECTRONIC.
E	DPS ELECTRONIC.
F	CENTER ELECTRONIC.
G	AFT ELECTRONIC.
H	HARPOON (RACK E1) On aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405

NEW

CIRCUIT BREAKER TYPE	*BUS CODE*
MAIN AC BUS A	1A
MAIN AC BUS B	1B
MONITORABLE ESSENTIAL AC BUS	1C
START ESSENTIAL AC BUS	1D
FLIGHT ESSENTIAL AC BUS	1E
MAIN DC BUS	2A
MAIN DC BUS ELECTRONICS	2B
EXTENSION MAIN DC BUS	2C
MONITORABLE ESSENTIAL DC BUS	2D
MONITORABLE ESSENTIAL DC BUS ELECTRONICS	2E
FLIGHT ESSENTIAL DC BUS	2F
GROUND OPERATION DC BUS	2G
APU ESSENTIAL DC BUS	2H
START ESSENTIAL	2J

LOC CODE	*CIRCUIT BREAKER NAME*	*BUS CODE*
D	ADF-LF	2A
D	AFT CAMERA ARM SIG	2A
C	AFT FLOOR HTR	1B
C	AFT FUEL TRANS PUMP	1B
C	AFT LTG XMFR	1B
A	AIR COND AIR MULTIPLIER VALVE	2D
A	AIR COND BLOWER CONT L	2D
A	AIR COND BLOWER CONT R	2D
A	AIRFOIL IND & OV HT WARNING	1C
A	ALTM VIB NAV On aircraft BUNO 153443 through 159329 except 158928	1C
D	AMB SEA NM	1C
A	ANGLE OF ATTACK INST PWR	2D
G	APPLIANCE OUTLET	1B

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 1 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	*CIRCUIT BREAKER NAME*	*BUS CODE*
A	APU BLEED AIR START VALVE	2G
A	APU DOOR POS LIGHT	2H
A	APU ESSENTIAL BUS FEEDER	2D
A	APU ESSENTIAL BUS FEEDER	2G
A	APU EXHAUST DOOR ACT	2H
A	APU FIRE DET HORN	2H
A	APU FIRE EXTINGUISHER AUTO CONT	2H
A	APU FIRE EXTINGUISHER AUTO REL	2H
A	APU FIRE EXTINGUISHER MANUAL CONT	2H
A	APU FIRE EXTINGUISHER MANUAL REL	2H
A	APU FUEL AND IGNITION	2G
A	APU FUEL VALVE	2G
A	APU GEN CONT	2G
A	APU INTAKE DOOR ACT	2H
A	APU LOAD AND SHUTOFF VALVE	2G
A	APU PANEL LIGHTS	2G
A	APU START CONTROL	2G
A	ARMAMENT 1	2C
A	ARMAMENT 2	2C
A	ARMAMENT 3	2C
D	ARMAMENT POWER KILL STORES	2C
D	ARMAMENT POWER MASTER CONT	2C
D	ARMAMENT POWER SEARCH STORES	2C
B	ARMAMENT JETTISON	2D
A	ARMT CKT BKR PNL	1C
A	ATTITUDE IND PILOT	1C
B	ATTITUDE IND V GYRO	1E
A	ATTITUDE IND & VERT GYRO COPLT	1C
C	AUTOPILOT-ASW-31	1A
C	AUTOPILOT-ASW-31	2B
B	AUX CONT, GEN 4	2F
E	AUX READOUT DISPLAY NAV/COM-IP-919/ASA-70	1A
E	AUX READOUT DISPLAY TACO-IP-919/ASA-70	1A
A	AUX VENT ACTR	1C
A	AUX VENT CONTROL	2D
D	BARO ALTM NAV On aircraft BUNO 158928, 159503 and subsequent	2A
C	BEACON, BOTTOM LT } On aircraft BUNO 153443 through 159875 not incorporating AFC 314	1B
C	BEACON, TOP LT }	1B
A	BLEED AIR FIREWALL SHUT-OFF VALVE ENG NO. 1	2J
A	BLEED AIR FIREWALL SHUT-OFF ENG NO. 2	2J
A	BLEED AIR FIREWALL SHUT-OFF ENG NO. 3	2J
A	BLEED AIR FIREWALL SHUT-OFF ENG NO. 4	2J
A	BLEED AIR MANF PRESS IND	1C

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 2 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	CIRCUIT BREAKER NAME	BUS CODE
D	BOMB BAY DOOR CONT	2D
D	BOMB BAY DOORS CONT	2C
D	BOMB BAY DOORS SYS 1	2C
D	BOMB BAY DOORS SYS 2	2C
A	BOMB BAY HEAT & CONTROL	2C
D	BOMB BAY POWER	2C
C	BOMB BAY & SERVICE AREA LT	1B
B	BOMB RACK LOCK PWER CTR	2D
B	BOMB RACK LOCK PWER PORT	2D
B	BOMB RACK LOCK PWER STBD	2D
C	BRAKE FLAP L & R	2A
A	BRAKE PRESS IND, EMERG	1C
A	BRAKE PRESS IND, NORM	1C
C	BT REC	1A
C	BT REC	2B
H	BTRY HTR STA 10	1A
H	BTRY HTR STA 11/12	1A
H	BTRY HTR STA 13	1A
H	BTRY HTR STA 14	1A
H	BTRY HTR STA 15/16	1A
H	BTRY HTR STA 17	1A
	(On aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405)	
A	BUS A CONT	2D
A	BUS B CONT	2D
C	CABIN EXHAUST FAN	1B
A	CABIN EXH FAN CONT	2C
A	CABIN TEMP CONT	1C
D	CAMERA, AFT PWR	1A
D	CAMERA, FWD DRIVE	1A
D	CAMERA, FWD HEAT	1A
A	CB PNL RED EDGE LIGHTS	1C
D	CENTRAL REP ATTD/HDG	1C
D	CENTRAL REP ATT/HDG	2D
D	CENTRAL REP BRG/HDG	1C
D	CENTRAL REP BRG/HDG	2D
D	CENTRAL REP DIST . . . Not Used	1C
D	CENTRAL REP DIST . . . Not Used	2D
C	CKT BKR PNL, LTS L SIDE FWD	1B
C	CKT BKR PNL, LTS MN LOAD CENTER	1B
C	CKT BKR PNL, LTS L SIDE, CTR & AFT	1B
C	COMM INTERFACE 1 (Teletype)	1A
D	COMM INTERFACE 2 (Data Link)	1C
D	COMM SYS SEL	1C
D	COMM SYS SEL	2D
B	COMMAND BELL	2F
A	COMPASS LT	2D
E	COMPTR ALTM On aircraft BUNO 153443 through 159329 except 158928	2B
E	COMPUTER-ASQ-114(V)	1A
H	CONT PORT	2C
H	CONT STBD (On aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405)	2C

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 3 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	CIRCUIT BREAKER NAME	BUS CODE
B	COPILOT ATTITUDE IND	1C
A	COPILOT CONSOLE, RED EDGE LT	2D
C	COUNT ACCEL	2A
A	CRASH LOCATOR PWR On aircraft BUNO 159323, 159503 and subsequent	2D
A	CROSSFEED VALVE ACTUATOR 1	1C
A	CROSSFEED VALVE ACTUATOR 2	1C
A	CROSSFEED VALVE ACTUATOR 3	1C
A	CROSSFEED VALVE ACTUATOR 4	1C
A	CROSSOVER VALVE	1C
D	DATA LINK	1A
D	DATA TERM SET	1C
D	DATA TERM SET	2D
F	DIFAR SENSOR STA NO. 1-AQA-7 (CASS, primary power)	2B
F	DIFAR SENSOR STA NO. 2-AQA-7 (CASS, emergency power)	2B
G	DINETTE & LWR FUS	1A
A	DOME & FLT CAPT READING LT	1C
F	DOPPLER RADAR	1C
F	DOPPLER RADAR	2E
D	DPS MON	2C
C	DPS POWER	1A
A	DUCT OVERHEAT TEST	2C
C	ECM	1A
C	ECM	2B
A	EDC AIR PRESS IND, LEFT	1C
A	EDC AIR PRESS IND, RIGHT	1C
A	EDC DISC L	2D
A	EDC DISC R	2D
A	EDC DUMP L	2D
A	EDC DUMP R	2D
C	ELECTRONIC AC FEEDERS LOAD MON CONT	2A
G	ELECTRONIC BAY FAN POWER On aircraft BUNO 153443 through 161004 except 161001 incorporating AFC 335	1C
A	ELECTRONIC CKT BKR PANELS	1C
C	ELECTRONIC FEEDERS AC LOAD MON CONT	1C
C	ELECTRONIC FEEDERS DC LOAD MON CONT	2A
C	ELECTRONIC POWER FEEDER NO. 1	2A
C	ELECTRONIC POWER FEEDER NO. 2	2A
C	ELECTRONIC POWER FEEDER NO. 3	2A
A	ELECTRONIC PWR 1	2D
A	ELECTRONIC PWR 2	2D
C	ELECTRONICS POWER FEEDER NO. 1	1A
C	ELECTRONICS POWER FEEDER NO. 2	1A
C	ELECTRONICS POWER FEEDER NO. 3	1A
A	EMERGENCY SHUTDOWN ENG 1 L	2D
A	EMERGENCY SHUTDOWN ENG 1 R	2D
A	EMERGENCY SHUTDOWN ENG 2 L	2D
A	EMERGENCY SHUTDOWN ENG 2 R	2D
A	EMERGENCY SHUTDOWN ENG 3 L	2D

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 4 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	*CIRCUIT BREAKER NAME*	*BUS CODE*
A	EMERGENCY SHUTDOWN ENG 3 R	2D
A	EMERGENCY SHUTDOWN ENG 4 L	2D
A	EMERGENCY SHUTDOWN ENG 4 R	2D
A	EMP DE-ICER CONT	2C
C	EMP DE-ICING PARTING STRIPS	1A
A	EMP DI TIMER MOTOR	1C
C	EMPENNAGE DE-ICE	1B
A	ENG ICE CONTROL ENG 1	2D
A	ENG ICE CONTROL ENG 2	2D
A	ENG ICE CONTROL ENG 3	2D
A	ENG ICE CONTROL ENG 4	2D
C	ESSENTIAL BUS	1A
A	ESSENTIAL IND & LTG CONT	1C
A	EXT PWR CONT	2G
H	FIRE DET } On aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405	1C
H	FIRE DET }	2E
A	FIRE DET CONT UNIT ENG 1	2D
A	FIRE DET CONT UNIT ENG 2	2D
A	FIRE DET CONT UNIT ENG 3	2D
A	FIRE DET CONT UNIT ENG 4	2D
A	FIRE DET HORN	2D
A	FIRE EXT-ALTERNATE ENG 1	2C
A	FIRE EXT-ALTERNATE ENG 2	2C
A	FIRE EXT-ALTERNATE ENG 3	2C
A	FIRE EXT-ALTERNATE ENG 4	2C
A	FIRE EXT NORMAL ENG 1	2D
A	FIRE EXT NORMAL ENG 2	2D
A	FIRE EXT NORMAL ENG 3	2D
A	FIRE EXT NORMAL ENG 4	2D
A	FLAP POS IND	1C
B	FLIGHT ESSENTIAL AC BUS	1E
A	FLIGHT IDLE STOP ENG 1	2D
A	FLIGHT IDLE STOP ENG 2	2D
A	FLIGHT IDLE STOP ENG 3	2D
A	FLIGHT IDLE STOP ENG 4	2D
F	FLOOD LIGHT SENSOR STA NO. 1 & No. 2	1C
A	FLT DIR PWR	2D
A	FLT DIR PWR	1C
A	FLT IDLE STOP CONT RELAY	2D
A	FLT STA & CABIN TEMP IND	1C
A	FLT STA FLOODLIGHTS SIDE CONSOLE & INST PNL RED PILOT	1C
A	FLT STA FLOODLIGHTS SIDE CONSOLE & INST PNL RED COPLT	1C
A	FLT STA FLOODLIGHTS INST PNL RED CTR	1C
A	FLT STA FLOODLIGHTS INST PNL WHITE PLTS	1C

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 5 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	CIRCUIT BREAKER NAME	BUS CODE
A	FLT STA INST RED LIGHTS PILOT EDGE & POST	1C
A	FLT STA INST RED LIGHTS CTR POST	1C
A	FLT STA INST RED LIGHTS COPLT POST	1C
A	FLT STA INST RED LIGHTS OVHD POST	1C
A	FLT STA TEMP CONT ϕA	1C
D	FORWARD CAMERA, CONT	2A
D	FORWARD CAMERA, MOUNT	2A
A	FREE AIR TEMP IND	2C
A	FUEL BOOST PUMP CONT 1	2C
A	FUEL BOOST PUMP CONT 2	2C
A	FUEL BOOST PUMP CONT 3	2C
A	FUEL BOOST PUMP CONT 4	2C
C	FUEL BOOSTER PUMP NO. 1	1A
C	FUEL BOOSTER PUMP NO. 3	1A
C	FUEL BOOSTER NO. 2	1B
C	FUEL BOOSTER NO. 4	1B
A	FUEL XFEED MANF PRESS IND	1C
C	FUEL DUMP CONT	2A
C	FUEL DUMP PUMP	1A
C	FUEL DUMP VALVE	2A
C	FUEL FLOW IND	1A
C	FUEL INLET VALVE CONT TANK NO. 1	2A
C	FUEL INLET VALVE CONT TANK NO. 2	2A
C	FUEL INLET VALVE CONT TANK NO. 3	2A
C	FUEL INLET VALVE CONT TANK NO. 4	2A
C	FUEL INLET VALVE CONT TANK NO. 5	2A
C	FUEL QTY IND FUELING PNL	1A
A	FUEL QUANTITY INDICATOR TANK 1	1C
A	FUEL QUANTITY INDICATOR TANK 2	1C
A	FUEL QUANTITY INDICATOR TANK 3	1C
A	FUEL QUANTITY INDICATOR TANK 4	1C
A	FUEL QUANTITY INDICATOR TANK 5	1C
A	FUEL QUANTITY INDICATOR TOTALIZER	1C
A	FUEL QTY SYS TEST	2C
A	FUEL SHUT-OFF VALVE ENG NO. 1	2J
A	FUEL SHUT-OFF VALVE ENG NO. 2	2J
A	FUEL SHUT-OFF VALVE ENG NO. 3	2J
A	FUEL SHUT-OFF VALVE ENG NO. 4	2J
A	FUEL TANK SHUTOFF VALVE CONT ENG 1	1C
A	FUEL TANK SHUTOFF VALVE CONT ENG 2	1C
A	FUEL TANK SHUTOFF VALVE CONT ENG 3	1C
A	FUEL TANK SHUTOFF VALVE CONT ENG 4	1C
A	FUEL TRANSFER PUMP CONT AFT	2C
A	FUEL TRANSFER PUMP CONT FWD	2C
A	FUEL & IGNITION CONT ENG 1	2J

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 6 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	*CIRCUIT BREAKER NAME*	*BUS CODE*
A	FUEL & IGNITION CONT ENG 2	2J
A	FUEL & IGNITION CONT ENG 3	2J
A	FUEL & IGNITION CONT ENG 4	2J
A	FUS BLEED AIR ISOLATION VALVES, LEFT	2J
A	FUS BLEED AIR ISOLATION VALVES, RIGHT	2J
D	FWD CAMERA CONT	2B
D	FWD CAMERA MOUNT	2B
C	FWD FLOOR HTR	1B
C	FWD FUEL TRANSFER PUMP	1A
A	FWD LTG BUS XMFR ϕB	1C
D	FWD NAV INTERCONNECT BOX BUS 1	2D
D	FWD NAV INTERCONNECT BOX BUS 2	2D
D	FWD NAV INTERCONNECT BOX BUS 3	2D
D	FWD NAV INTERCONNECT BOX BUS 1	1C
D	FWD NAV INTERCONNECT BOX BUS 2	1C
C	GALLEY & LAV LT	1B
C	GALLEY POWER	1B
C	GALLEY & RADIANT HEATER	2A
A	GENERATOR 2 CONT	2D
A	GENERATOR 3 CONT	2D
A	GENERATOR 4 CONT	2D
A	GENERATOR 4 TRANS	2D
A	GLARESHIELD & PED EDGE & POST	1C
D	GLIDESLOPE	2E
B	GROUND OPERATION BUS RELAY	2F
C	GRD AIR SENSING	2A
B	GYRO HORIZON	1E
H	HACLCS } On aircraft BUNO 159889, 160290 and subsequent	1A
H	HACLCS } and prior aircraft incorporating AFC 405	2C
C	HEAT EXCHANGER LH BLOWER	1B
C	HEAT EXCHANGER RH BLOWER	1B
G	HEATER POWER, INERTIAL SYS NO. 1	1C
D	HF SECURE VOICE	1C
D	HF-1–ARC-161	1C
D	HF-1–ARC-161	2D
C	HF-2–ARC-161	1A
C	HF-2–ARC-161	2B
G	HOT CUP LEFT	1B
G	HOT CUP RIGHT	1B
A	HSI MODE LIGHTS	1C
D	HSI, COPILOT	1C
D	HSI, PILOT	1C
D	HSI, NAV	1C
A	HYD FLUID QTY IND	2C
C	HYD PUMP NO. 1	1A
A	HYDRAULIC PUMP 1B CONT	2G
A	HYDRAULIC PUMP 1B PWR	2G

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 7 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	CIRCUIT BREAKER NAME	BUS CODE
A	HYDRAULIC PUMP 1A CONT	2D
C	HYDRAULIC PUMP NO. 1A and NO. 2	1B
A	HYD PRESS IND SYS NO. 1	1C
A	HYD PRESS IND SYS NO. 2	1C
A	HYD SYS PUMP CONT 1	2C
A	HYD SYS PUMP CONT 2	2C
D	IACS-RLY	2A
D	IACS-CDG	1A
A	ICE DETECTOR	1C
A	ICS IND LIGHTS	2D
C	IFF INTERROGATOR – APX-76A	1A
C	IFF INTERROGATOR – APX-76A	2B
	INERTIAL NAVIGATION SYSTEM NO. 1 (ASN-84)	
G	HEATER POWER (On aircraft BUNO 156507 through 161004 except 161001 not incorporating AFC 408)	1C
G	RUN POWER (On aircraft BUNO 156507 through 161004 except 161001 not incorporating AFC 408)	1C
G	CONT (On aircraft BUNO 156507 through 161004 except 161001 not incorporating AFC 408)	2E
	INERTIAL NAVIGATION SYSTEM NO. 2 (ASN-84)	
G	HEATER POWER (On aircraft BUNO 156507 through 161004 except 161001 not incorporating AFC 408)	1C
G	RUN POWER (On aircraft BUNO 156507 through 161004 except 161001 not incorporating AFC 408)	1A
G	CONT (On aircraft BUNO 156507 through 161004 except 161001 not incorporating AFC 408)	2B
	INERTIAL NAVIGATION SYSTEM NO. 1 (LTN-72)	
G	DDU CH-1 (On aircraft BUNO 161001, 161005 and subsequent and prior aircraft incorporating AFC 408)	2D
G	INS NO. 1 HTR (On aircraft BUNO 161001, 161005 and subsequent and prior aircraft incorporating AFC 408)	1C
G	INS NO. 1 MHRS (On aircraft BUNO 161001, 161005 and subsequent and prior aircraft incorporating AFC 408)	1C
G	INS NO. 1 RUN (On aircraft BUNO 161001, 161005 and subsequent and prior aircraft incorporating AFC 408)	1C
	INERTIAL NAVIGATION SYSTEM NO. 2 (LTN-72)	
G	DDU CH-2 (On aircraft BUNO 161001, 161005 and subsequent and prior aircraft incorporating AFC 408)	2A
G	INS NO. 2 HTR (On aircraft BUNO 161001, 161005 and subsequent and prior aircraft incorporating AFC 408)	1A
G	INS NO. 2 MHRS (On aircraft BUNO 161001, 161005 and subsequent and prior aircraft incorporating AFC 408)	1A
G	INS NO. 2 RUN (On aircraft BUNO 161001, 161005 and subsequent and prior aircraft incorporating AFC 408)	1A
A	INST RED LIGHTS, CENTER POST	1C
A	INST RED LIGHTS, COPILOT POST	1C
A	INST RED LIGHTS, GLARESHIELD & RED EDGE & POST	1C
A	INST RED LIGHTS, OVHD PANELS EDGE	1C
A	INST RED LIGHTS, OVHD POST	1C
A	INST RED LIGHTS, PILOT EDGE & POST	1C
A	INST BUS XMFR NO. 1	1C
A	INST BUS XMFR NO. 2	1C
D	INTERPHONE	2D
A	INVERTER PWR	2J
B	INVERTER RELAY	2F
C	IRDS AUX DISPLAY (On aircraft BUNO 158928, 159503 and subsequent and prior aircraft incorporating AFC 359)	1A
C	IRDS HEATER (On aircraft BUNO 158928, 159503 and subsequent and prior aircraft incorporating AFC 359)	1A
C	IRDS RECORDER (On aircraft BUNO 158928, 159503 and subsequent and prior aircraft incorporating AFC 359)	1A
C	IRDS RECORDER (On aircraft BUNO 158928, 159503 and subsequent and prior aircraft incorporating AFC 359)	2A
C	IRDS TURRET CONT (On aircraft BUNO 158928, 159503 and subsequent and prior aircraft incorporating AFC 359)	1A
C	IRDS TURRET CONT (On aircraft BUNO 158928, 159503 and subsequent and prior aircraft incorporating AFC 359)	2A
C	IRDS SYS (On aircraft BUNO 158928, 159503 and subsequent and prior aircraft incorporating AFC 359)	1A
C	IRDS SYS (On aircraft BUNO 158928, 159503 and subsequent and prior aircraft incorporating AFC 359)	2A

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 8 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	*CIRCUIT BREAKER NAME*	*BUS CODE*
A	JETTISON, BOMB BAY STORES	2D
D	JETTISON, BOMB BAY STORES	2D
D	JETTISON, CONT	2D
D	JETTISON, LEFT WING	2D
D	JETTISON, PROGRAMMER	1C
D	JETTISON, RIGHT WING	2D
D	KILL STORES ARM	2C
D	KILL STORES CONT	2C
D	KILL STORES REL	2C
G	LADDER CONT	2B
G	LADDER POWER	1A
A	LANDING GEAR CONT VALVE	2C
A	LANDING GEAR POS IND	2C
A	LANDING GEAR WARNING LIGHTS	2C
C	LATCH RELEASE & SOV	2A
G	LAV	1A
A	LDG LIGHT LEFT	1C
A	LDG LIGHT RIGHT	1C
D	LEFT WING POWER	2C
A	LTG BUS XMFR, FWD AC	1C
C	LOAD MONITORING CONTROL, MASTER	2A
E	LOGIC UNIT NO. 1 (DPS INTERFACE NO. 1)	1A
E	LOGIC UNIT NO. 2 (DPS INTERFACE NO. 2)	1A
E	LOGIC UNIT NO. 3 (DPS INTERFACE NO. 3)	1A
E	LOGIC UNIT NO. 4 (DPS INTERFACE NO. 4) On aircraft BUNO 158928, 159503 and subsequent	1A
C	LORAN On aircraft BUNO 156507 through 158927 and 158929 through 159329 not incorporating AFC 414	1A
A	LOW RPM SOL ENG 1, 2, 3, 4	2C
C	MAD REC	1A
C	MAD REC	2B
C	SAD –	1A
C	SAD –	2B
C	MAD SYSTEM	1A
E	MAG TAPE A On aircraft BUNO 156507 through 161131 except 159889	1A
E	MAG TAPE B On aircraft BUNO 156507 through 158927 and 158929 through 159329	1A
E	MAG TAPE CONT	2A
E	MAG TAPE UNIT A — On aircraft BUNO 159889, 161132 and subsequent	2A
E	MAG TAPE UNIT B	2A
C	MKR BCN	2B
D	MISSILE DC (Not Used) — On aircraft BUNO 156507 through 160289 except 159889	2C
D	MISSILE – ARW-77 (Not Used) — On aircraft BUNO 156507 through 160289 except 159889	1C
H	MISSILE PORT — On aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405	1A
H	MISSILE STBD — On aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405	1A
E	MULTIPURPOSE DISPLAY, SENSOR STA NO. 3 – IP-918/ASA-70	1A
E	MULTIPURPOSE DISPLAY TACO – IP-917/ASA-70	1A
C	NAV-COM LTS, EDGE & MAP	1A
C	NAV COM STA FLOOD LT	2B
C	NAV COM STA IND LT	2B

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 9 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	*CIRCUIT BREAKER NAME*	*BUS CODE*
C	NAV COM STA ICS IND LT	2B
A	NTS CHECK	2C
G	OBS, LH & RH 115/200 VOLT	1A
A	OIL COOLER FLAP CONTROL ENG 1	1C
A	OIL COOLER FLAP CONTROL ENG 2	1C
A	OIL COOLER FLAP CONTROL ENG 3	1C
A	OIL COOLER FLAP CONTROL ENG 4	1C
A	OIL COOLER FLAP POSI IND ENG NO. 1	1C
A	OIL COOLER FLAP POSI IND ENG NO. 2	1C
A	OIL COOLER FLAP POSI IND ENG NO. 3	1C
A	OIL COOLER FLAP POSI IND ENG NO. 4	1C
A	OIL PRESS IND ENG NO. 1	1C
A	OIL PRESS IND ENG NO. 2	1C
A	OIL PRESS IND ENG NO. 3	1C
A	OIL PRESS IND ENG NO. 4	1C
A	OIL QTY IND ENG 1 & 2	2C
A	OIL QTY IND ENG 3 & 4	2C
A	OIL QUAN IND ENG 1, 2, 3, & 4	2G
A	OIL TANK SHUTOFF VALVE ENG 1	2D
A	OIL TANK SHUTOFF VALVE ENG 2	2D
A	OIL TANK SHUTOFF VALVE ENG 3	2D
A	OIL TANK SHUTOFF VALVE ENG 4	2D
A	OIL TEMP IND ENG 1 & 2	2C
A	OIL TEMP IND ENG 3 & 4	2C
C	OMEGA } On aircraft BUNO 158928, 159503 and subsequent	1A
C	OMEGA } On aircraft BUNO 158928, 159503 and subsequent	2A
C	OMEGA Aircraft BUNO 156507 through 158927 and 158929 through 159329	1A
E	ORD IND PANEL	1A
C	OTPI	1A
C	OTPI	2B
B	OUTFLOW VALVE OVRD	1E
C	OVHD FLUOR LTS, FWD COMP	1A
C	OVHD FLUOR LTS, REST AREA	1A
A	OVHD PNLS EDGE	1C
C	OVHD FLUOR LTS, SONO	1A
B	PILOT ATTITUDE IND	1C
A	PILOT CONSOLE, RED EDGE LIGHT	2D
E	PILOT'S KEYSET	1A
D	PILOT & COPILOT, 115/200 VOLTS	1A
B	PITCH LOCK RESET ENG 1	2F
B	PITCH LOCK RESET ENG 2	2F

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 10 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	*CIRCUIT BREAKER NAME*	*BUS CODE*
B	PITCH LOCK RESET ENG 3	2F
B	PITCH LOCK RESET ENG 4	2F
B	PITOT HEATER, LEFT	1E
A	PITOT HTR RH	1C
A	POWER SENSING	2D
A	PRIME CONT	2J
C	PROP ANTI-ICE SPINNER NOSE NO. 1	1B
C	PROP ANTI-ICE SPINNER NOSE NO. 2	1B
C	PROP ANTI-ICE SPINNER NOSE NO. 3	1B
C	PROP ANTI-ICE SPINNER NOSE NO. 4	1B
A	PROP AUTO FEATHER ENG 1	2C
A	PROP AUTO FEATHER ENG 2	2C
A	PROP AUTO FEATHER ENG 3	2C
A	PROP AUTO FEATHER ENG 4	2C
C	PROP ANTI-ICE & DE-ICE POWER	1B
A	PROP DE-ICE CONT	2C
C	PROP DE-ICE CUFF SKIRTS ISLAND NO. 1	1B
C	PROP DE-ICE CUFF SKIRTS ISLAND NO. 2	1B
C	PROP DE-ICE CUFF SKIRTS ISLAND NO. 3	1B
C	PROP DE-ICE CUFF SKIRTS ISLAND NO. 4	1B
C	PROP DE-ICE TEST	1B
A	PROP FEATHER ENG 1	2D
A	PROP FEATHER ENG 4	2D
A	PROP FEATHER ENG 2	2C
A	PROP FEATHER ENG 3	2C
C	PROP FEATHER PUMP NO. 1 NORMAL	1B
C	PROP FEATHER PUMP NO. 4 NORMAL	1B
A	PROP SYNC CONT	2C
C	PROPELLER FEATHER PUMPS NO. 1 & NO. 4 ALT	1A
C	PROPELLER FEATHER PUMPS NO. 2	1A
C	PROPELLER FEATHER PUMPS NO. 3	1A
A	PUMP CONT NO. 1A, HYD	2D
E	PWR DISTR BOX	2B
H	PYRO PORT } On aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405	2C
H	PYRO STBD }	2C
D	RACK B3 & D1, TACCO STN UTLTY	1A
C	RACK OVERHEAT WARNING	2A
B	RADAR ALTM PWR	1E
E	RADAR INTERFACE	1A
A	RAWS NO. 1 TEST	2D
A	RAWS NO. 2 TEST	2D
A	RAWS PWR NO. 1	1C
A	RAWS PWR NO. 2	1C
G	REFRIGERATOR	1B

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 11 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	CIRCUIT BREAKER NAME	BUS CODE
C	REFUELING, MASTER SW	2A
C	REFUELING SERVICE, LT	2A
D	RIGHT WING POWER	2C
A	ROTATING BEACON On aircraft BUNO 153443 through 159875 not incorporating AFC 314	2C
A	RUDDER BSTR SHUT-OFF VALVE	2D
E	SCAN CONV On aircraft BUNO 156507 through 159329 except 158928	1A
C	SEARCH RADAR	1A
C	SEARCH RADAR – APS-115	2B
D	SECURE VOICE Secure switching matrix	1C
D	SECURE VOICE Secure switching matrix	2D
B	SECURE ZERO	2F
H	SEEKER/MGU STA 10	1A
H	SEEKER/MGU STA 11/12	1A
H	SEEKER/MGU STA 13	1A
H	SEEKER/MGU STA 14	1A
H	SEEKER/MGU STA 15/16	1A
H	SEEKER/MGU STA 17	1A
H	SEEKER FIL STA 10	2C
H	SEEKER FIL STA 11/12	2C
H	SEEKER FIL STA 13	2C
H	SEEKER FIL STA 14	2C
H	SEEKER FIL STA 15/16	2C
H	SEEKER FIL STA 17	2C
	(NEW) On aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405	
F	SENSOR SONO JB	1A
F	SENSOR SONO JB	2B
F	SENSOR STA 1 & 2 INDICATOR LT	2B
C	SENSOR STA 3 FLOOD & REC LT	2B
C	SENSOR STA 3 IND	2B
F	SENSOR STA 1 & 2 DISPLAY – ASA-66	1A
F	SENSOR STA 1 & 2 DISPLAY – ASA-66	2A
F	SENSOR STA 1 & 2 DISPLAY PWR CONT – ASA-66	2A
	On aircraft BUNO 158928, 159503 and subsequent	
F	SENSOR STA 1 & 2 LTS, EDGE & JEZ	1A
F	SENSOR STA 1 & 2 LTS, FLOOD	1C
F	SENSOR STA 1 & 2 LTS, IND	2A
F	SENSOR STATION NO. 2 & RACK D2	1A
F	SENSOR STATION NO. 2 RACK E1 & G1	1A
C	SENSOR STATION 3 EDGE LIGHTS	1A
F	SENSOR TIME GEN	1A
D	SERVOED BAROMETRIC ALTIMETER, COPILOT	2D
D	SERVOED BAROMETRIC ALTIMETER, PILOT	2D
D	SERVOED BAROMETRIC ALTIMETER, COPILOT	1C
D	SERVOED BAROMETRIC ALTIMETER, PILOT	1C
F	SETAD	1A
C	SETAD	2A

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 12 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	CIRCUIT BREAKER NAME	BUS CODE
A	SEXTANT	1C
C	SIDE WSHLD DEFOG LOAD MON CONT	2A
C	SIDE WSHLD HT PWR, L	1A
C	SIDE WSHLD HT PWR, R	1A
A	SIDE WSHLD HT CONT L	2C
A	SIDE WSHLD HT CONT R	2C
A	SIGHT LIGHT	1C
E	SIGNAL DATA CONVERTER	1A
A	SIGNAL LT CONTROL	2D
A	SIGNAL LTS INST	2D
A	SIGNAL LTS OVHD	2D
A	SIGNAL LTS PED	2D
H	SIM On aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405	2C
D	SONO CONT	2C
F	SONO RCVR, SENSOR	1A
C	SONO REF SYS On aircraft BUNO 159889, 160290 and subsequent	1A
D	SONO RELEASE LH	2C
D	SONO RELEASE RH	2C
F	SONO TAPE REC	2B
F	SONO TAPE RECORDER J BOX	2B
D	SONO W/PRESS DOOR	1C
D	SPL WPN SECONDARY RELEASE CONT	2E
D	SPL WPN SECONDARY RELEASE PWR	2E
A	START CONTROL	2J
A	START ESSENTIAL BUS	1C
A	STEP LIGHT	1C
A	STROBE LIGHT	2C
C	STROBE LIGHT BOT ϕB	1B
C	STROBE LIGHT TOP ϕB	1B
	On aircraft BUNO 153443 through 159875 incorporating AFC 314 and 159883 and subsequent	
A	SYNC CONT	2C
C	SYNCH PHASER CONTROL	1A
D	TACAN	1C
D	TACAN	2D
D	TACCO STA IND LT	2A
D	TACO A1 & NOSE	1A
D	TACO STA EDGE LT	1A
D	TACO STA FLOOD LT	2D
A	TAC DISPLAY PILOT	2C
D	TACTICAL DISPLAY, PILOT	1A
D	TACTICAL DISPLAY, PWR CONT, PILOT	2A
D	TAS	1C
A	TAS	2D
A	TAXI LIGHTS	1C
C	TELETYPE DATA CONV	1A
C	TELETYPE DATA CONV	2B

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 13 of 15)

AC/DC POWER DISTRIBUTION CIRCUIT BREAKER LIST (Cont)

LOC CODE	*CIRCUIT BREAKER NAME*	*BUS CODE*
C	TELETYPE KEYBD	1A
C	TELETYPE SECURITY UNIT	1A
C	TELETYPE TELEPRINTER	1A
A	TEMP DATUM CONT ENG 1	2J
A	TEMP DATUM CONT ENG 2	2J
A	TEMP DATUM CONT ENG 3	2J
A	TEMP DATUM CONT ENG 4	2J
A	TEMP DATUM CONTROL ENG 1	1C
A	TEMP DATUM CONTROL ENG 2	1C
A	TEMP DATUM CONTROL ENG 3	1C
A	TEMP DATUM CONTROL ENG 4	1C
D	TORP CONT	2C
A	TORQUEMETER ENG 1	1C
A	TORQUEMETER ENG 2	1C
A	TORQUEMETER ENG 3	1C
A	TORQUEMETER ENG 4	1C
B	TRANSPONDER IFF PWR – APX-72	1E
A	TRANSPONDER IFF PWR CONT	2D
A	TRANSPONDER IFF TEST SET	2D
B	TRANSPONDER ZERO IFF	2F
A	TURBINE INLET TEMP IND ENG NO. 1	1D
A	TURBINE INLET TEMP IND ENG NO. 2	1D
A	TURBINE INLET TEMP IND ENG NO. 3	1D
A	TURBINE INLET TEMP IND ENG NO. 4	1D
A	TURN RATE GYRO COPLT	2D
A	TURN RATE GYRO PILOT	2D
B	TURN RATE GYRO PLT	2F
B	T414 CONTROL 1	2D
B	T414 CONTROL 2	2D
B	T414 POWER 1	2D
B	T414 POWER 2	2D
B	T414 POWER 3	2D
D	UHF SECURE VOICE	2D
C	UHF DF – ARA-50	2B
C	UHF DF – ARA-50	1B
F	UHF-1 – A344	2E
F	UHF-1 RCVR XMTR – ARC-143	1C
F	UHF-2 RCVR XMTR – ARC-143	1A
E	UNIVERSAL KEYSET SENSOR STA NO. 1	1A
E	UNIVERSAL KEYSET SENSOR STA NO. 2	1A
E	UNIVERSAL KEYSET NAV/COM	1A
B	UTILITY LIGHT PLT AND CO-PLT	2F
G	UTILITY OUTLET, BOT	1B
G	UTILITY OUTLET, JUG	1B
G	UTILITY OUTLET, OVEN	1B
G	UTILITY OUTLET, TOP	1B

Figure 1-25. AC/DC Power Distribution Circuit Breaker List (Sheet 14 of 15)

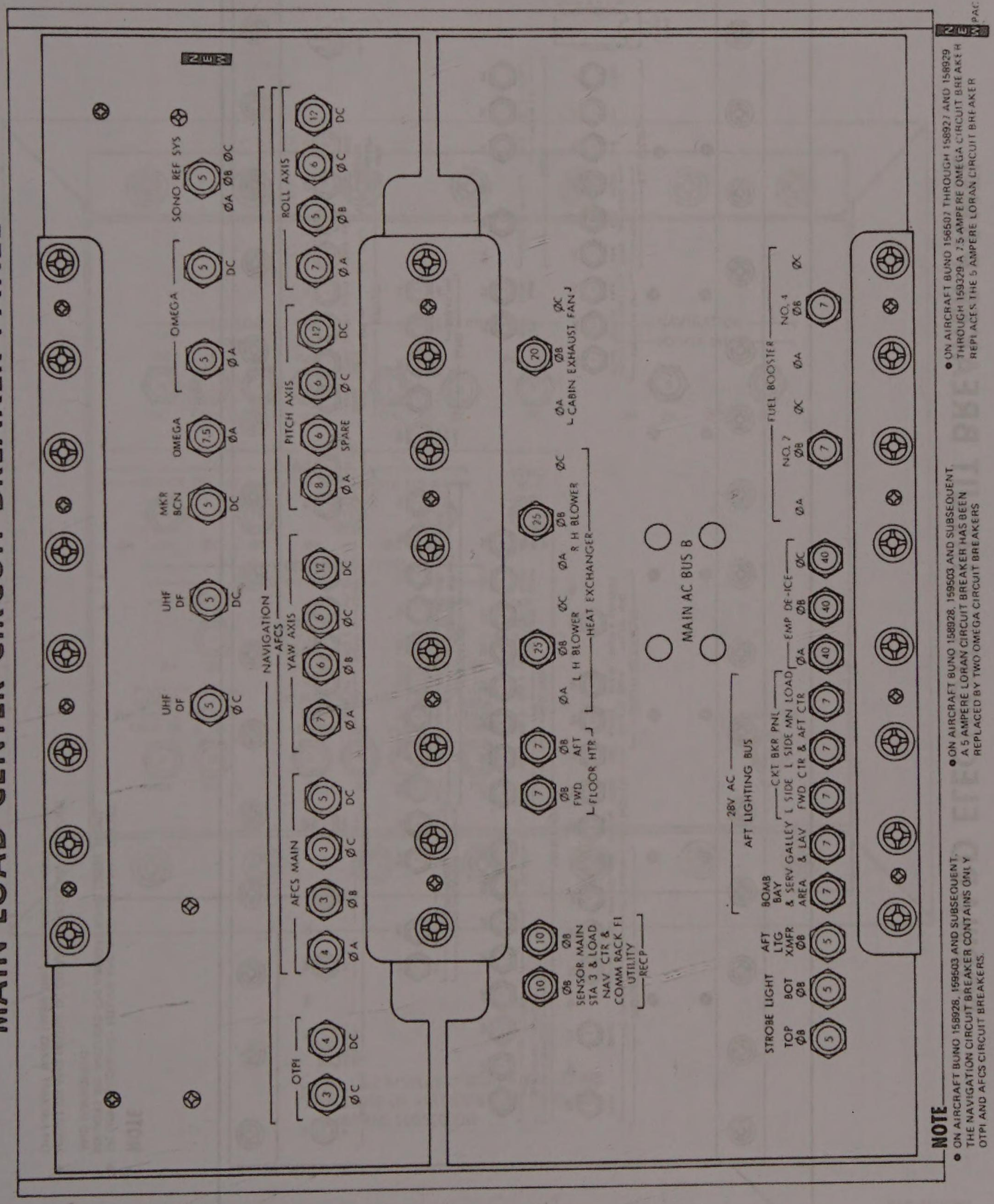


Figure 1-28. Main Load Center Circuit Breaker Panel (Sheet 4 of 4)

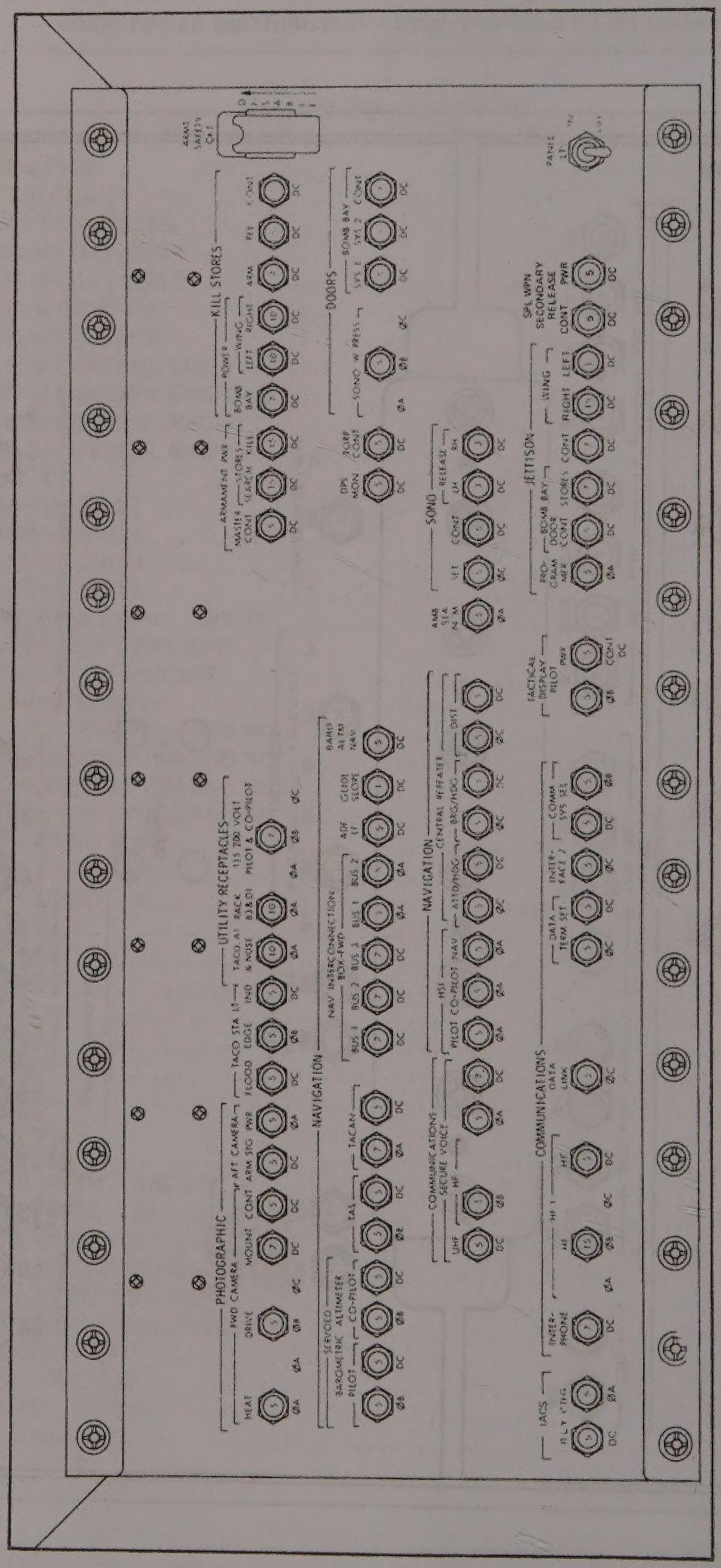


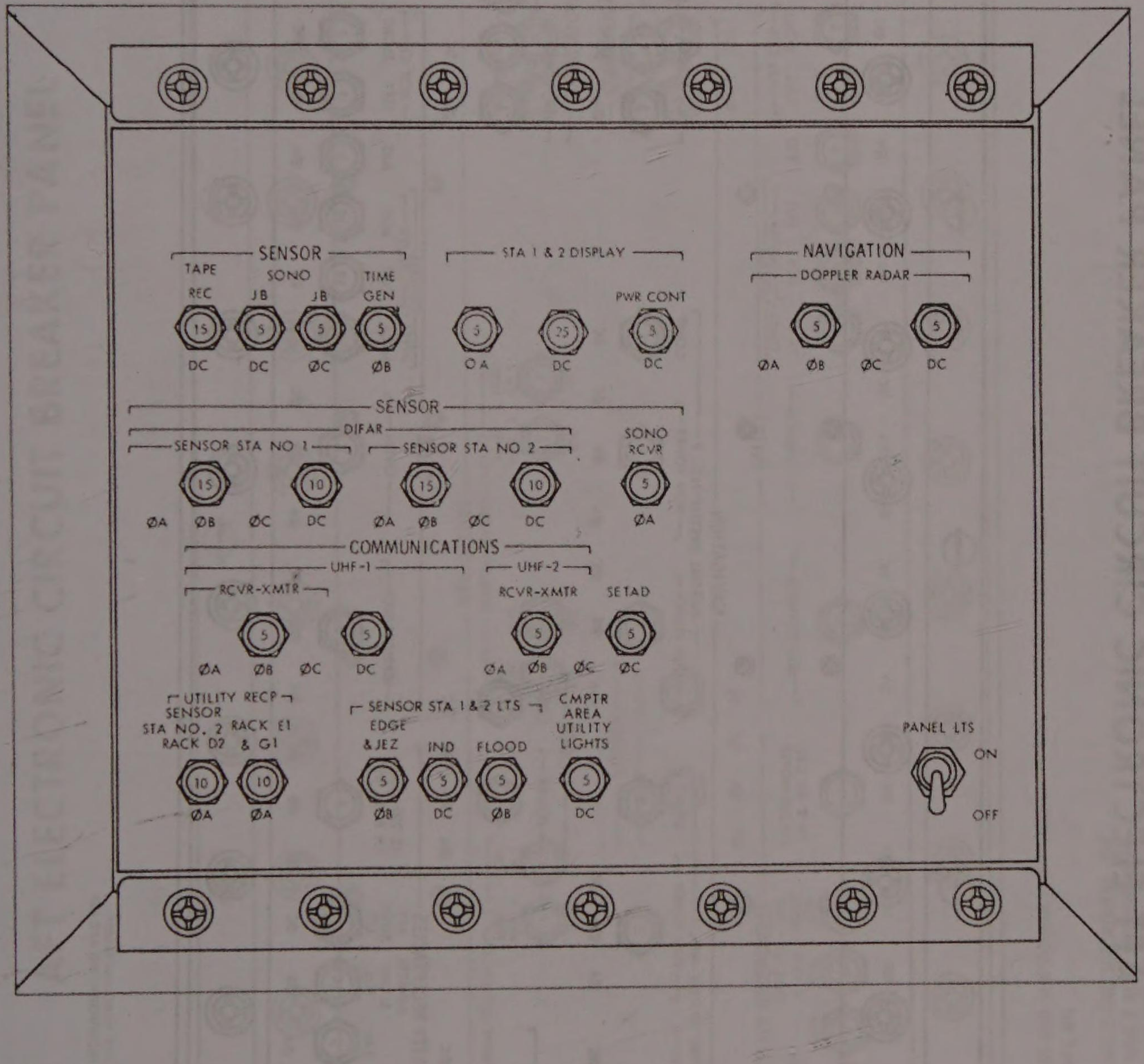
Figure 1-29. Forward Electronic Circuit Breaker Panel

NOTE

- SPL WPN SECONDARY RELEASE AND BARO ALTM NAV CIRCUIT BREAKERS ARE INCLUDED ON AIRCRAFT BUNO 158928, 159503 AND SUBSEQUENT.
- MISSILE ØB AND MISSILE DC CIRCUIT BREAKERS ARE INCLUDED ON AIRCRAFT BUNO 156507 THROUGH 160289 EXCEPT 159889.

PAC 11C3(0081

CENTER ELECTRONIC CIRCUIT BREAKER PANEL



NOTE

STA 1 & 2 DISPLAY CIRCUIT BREAKERS ARE INCLUDED ON AIRCRAFT BUNO 158928 AND 159503 AND SUBSEQUENT

PAC-1(C)0083

Figure 1-30. Center Electronic Circuit Breaker Panel

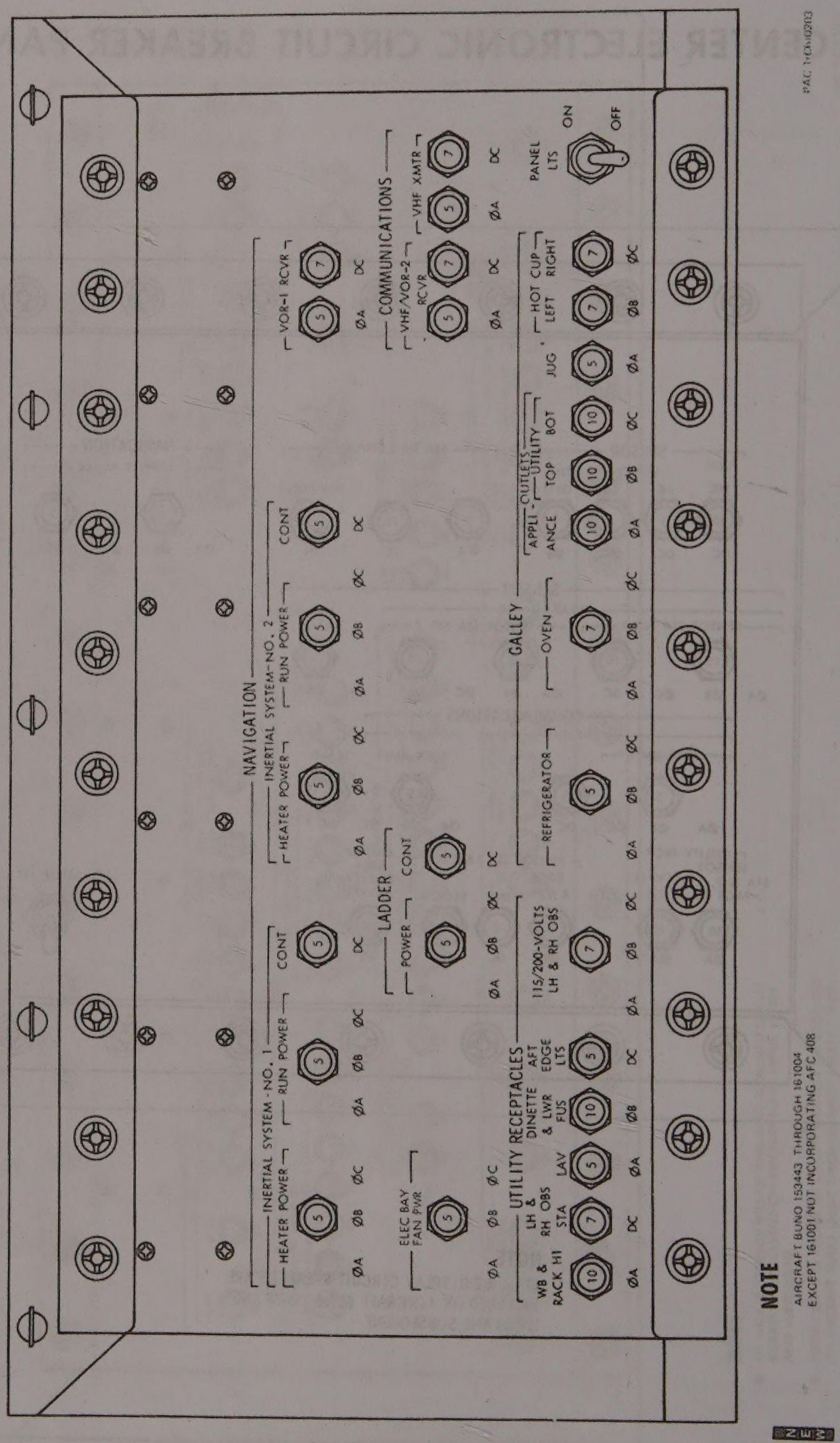
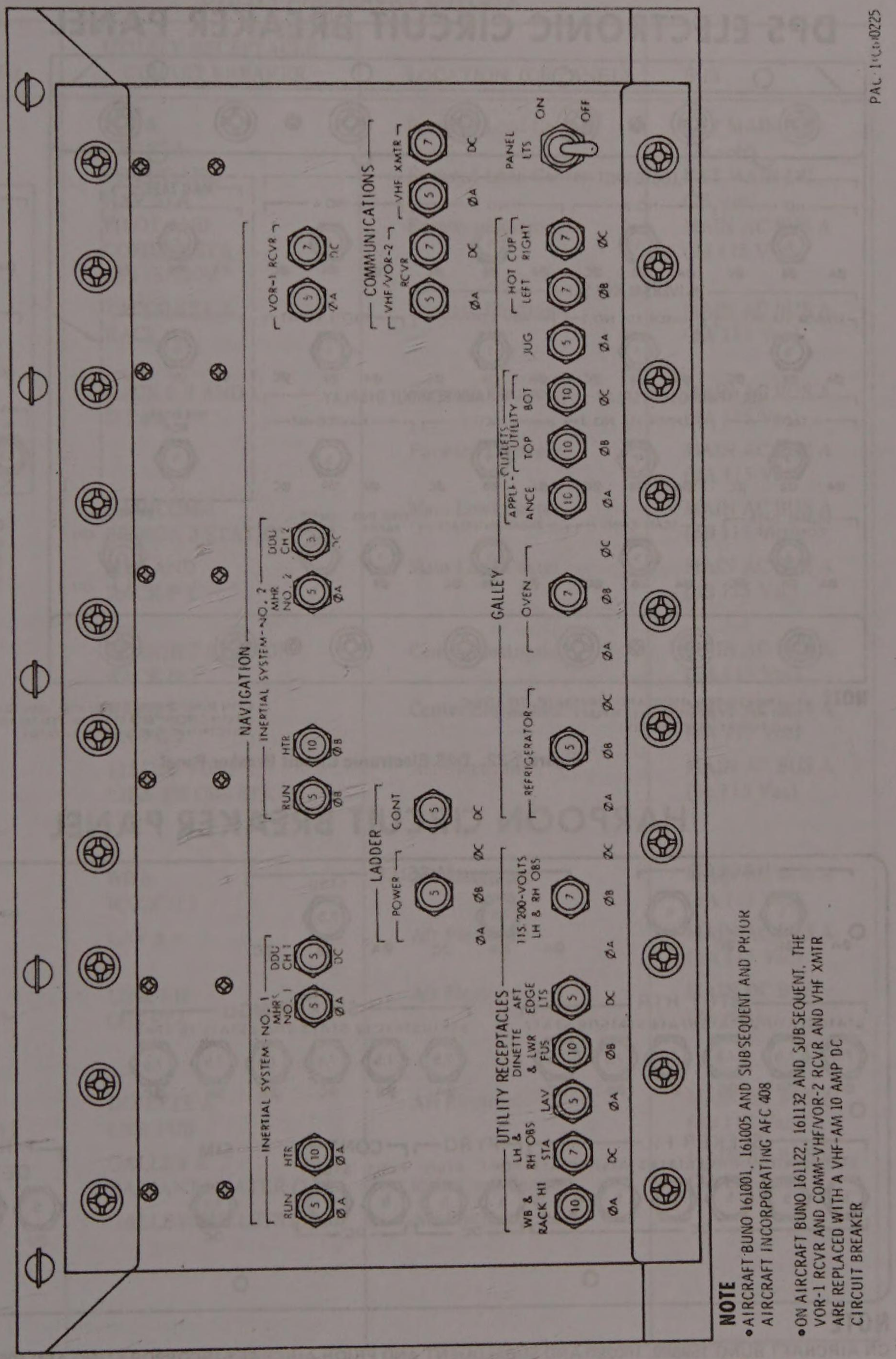


Figure 1-31. Aft Electronic Circuit Breaker Panel (Sheet 1 of 2)

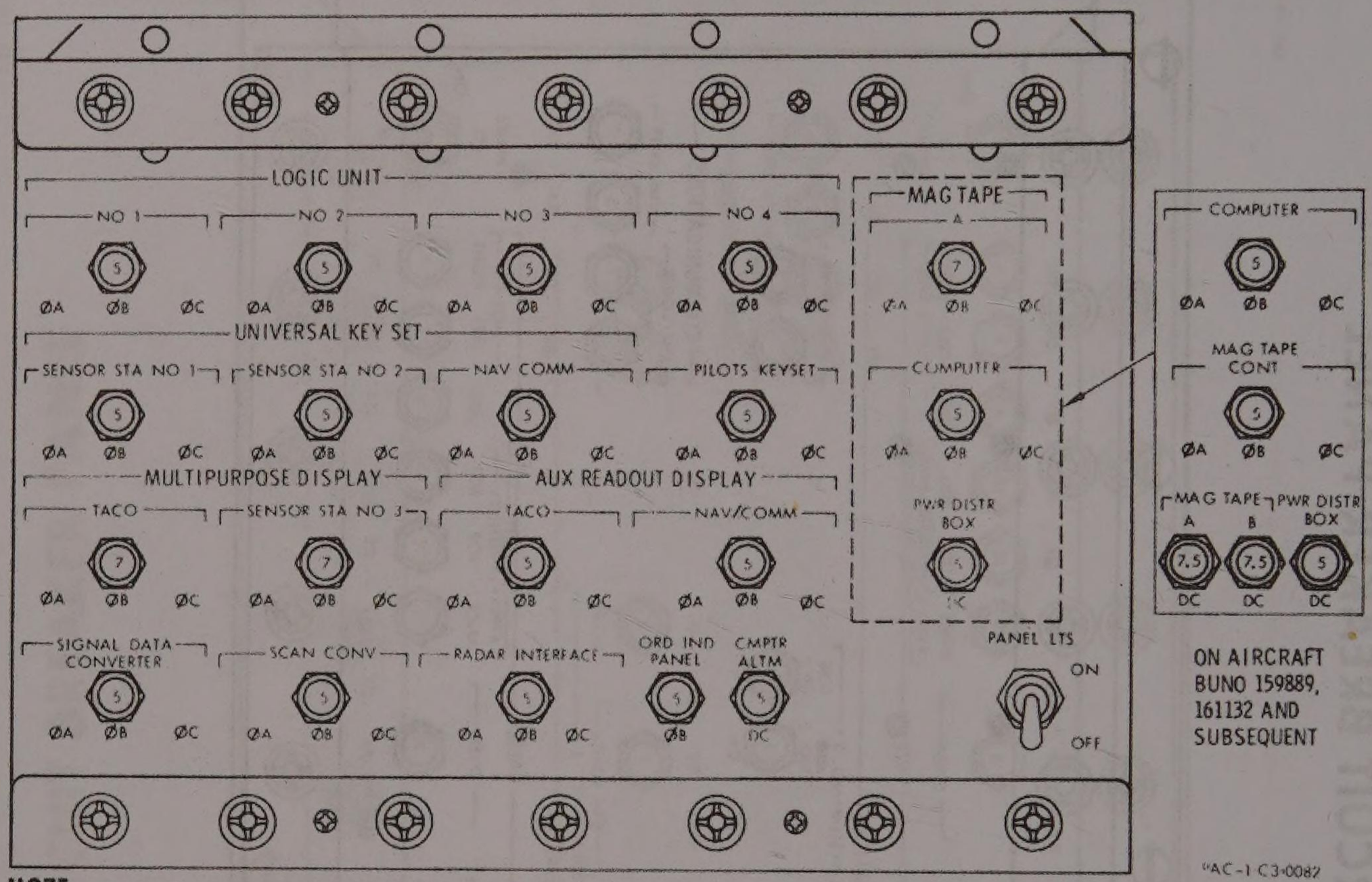


NOTE

- AIRCRAFT BUNO 161001, 161005 AND SUBSEQUENT AND PRIOR AIRCRAFT INCORPORATING AFC 408
- ON AIRCRAFT BUNO 161122, 161132 AND SUBSEQUENT, THE VOR-1 RCVR AND COMM-VHF/VOR-2 RCVR AND VHF XMTR ARE REPLACED WITH A VHF-AM 10 AMP DC CIRCUIT BREAKER

Figure 1-31. Aft Electronic Circuit Breaker Panel (Sheet 2 of 2)

DPS ELECTRONIC CIRCUIT BREAKER PANEL

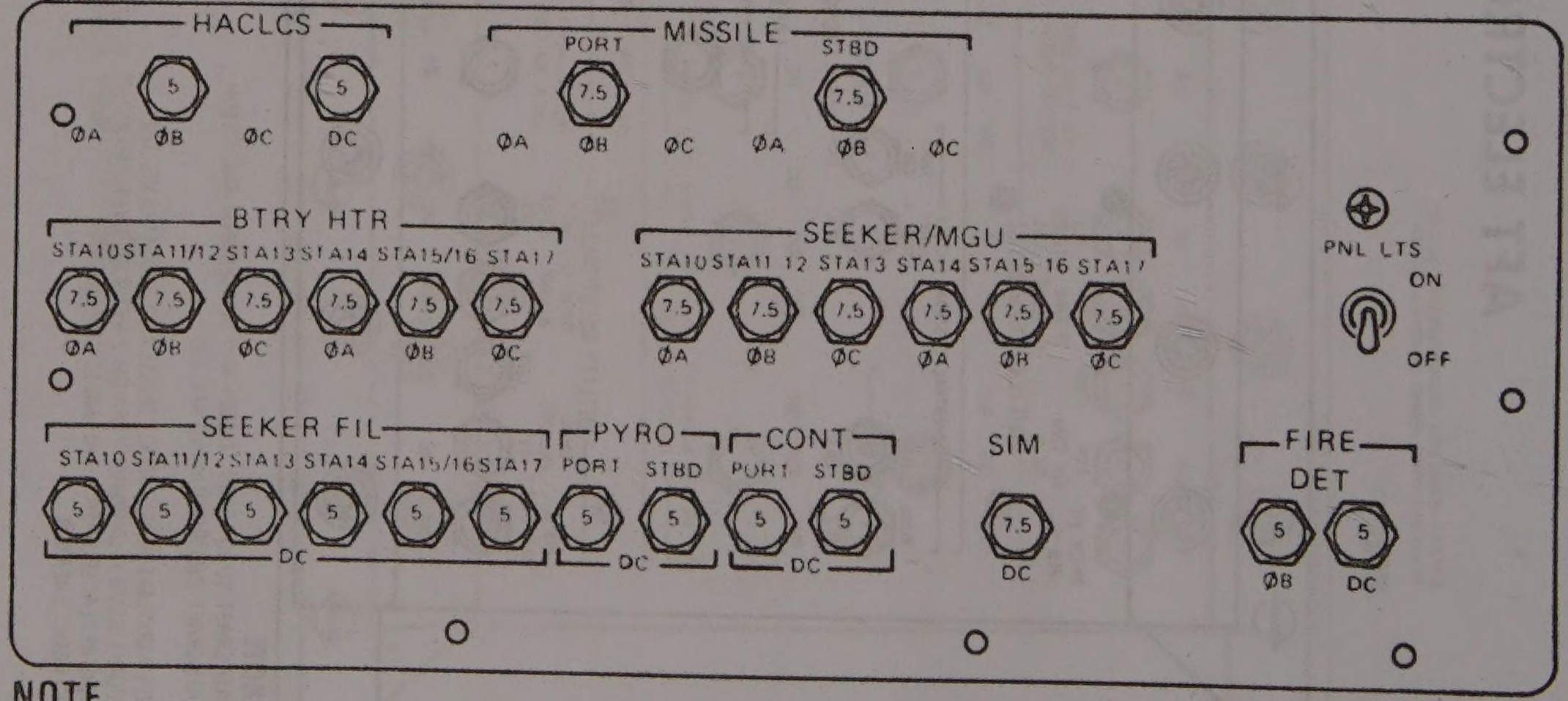


NOTE

- ON BUNO 158928, 159503 AND SUBSEQUENT, THE LOGIC UNIT NO. 4 CIRCUIT BREAKER REPLACES A 7-AMPERE MAG TAPE B CIRCUIT BREAKER
- ON BUNO 158928, 159503 AND SUBSEQUENT, THE CMPTR ALTM CIRCUIT BREAKER IS MOVED TO THE FORWARD ELECTRONIC CIRCUIT BREAKER PANEL

Figure 1-32. DPS Electronic Circuit Breaker Panel

HARPOON CIRCUIT BREAKER PANEL



NOTE

ON AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT AND PRIOR AIRCRAFT INCORPORATING AFC 405

PAC-1(C6)0062

Figure 1-33. Harpoon Circuit Breaker Panel

UTILITY AND SERVICE OUTLETS

STATION SERVED	UTILITY RECEPTACLE CIRCUIT BREAKER	LOCATION (CB PANEL)	BUS
Pilot (1) TACCO (1)	PLT & TAC STA	Forward Load Center	EXT MAIN DC (28 volt)
Copilot (1) Navigator (1)	CO-PLT AND NAV STA	Forward Load Center	EXT MAIN DC (28 volt)
Pilot (1) Copilot (1)	PILOT AND COPILOT STA 3ϕ 115/120V	Forward Electronic	MAIN AC BUS A (3ϕ 115 Vac)
TACCO (2) Fwd Radio (1) Rack	TACCO STA & RACK A1	Forward Electronic	MAIN AC BUS A (ϕA 115 Vac)
Rack B 3 (2) Rack D 1 (2)	RACK B 3 AND D 1 ϕA	Forward Electronic	MAIN AC BUS A (ϕA 115 Vac)
Test (1) Receptacle		Forward Electronic	MAIN AC BUS A (ϕA 115 Vac)
Nav/Com (2) Sensors 3 (2)	NAV/COMM SENSOR 3 STATION	Main Load Center	MAIN AC BUS A (ϕB 115 Vac)
Main Load (2) Center Rack F 1 (2)	MLC AND RACK F 1	Main Load Center	MAIN AC BUS A (ϕB 115 Vac)
Sensor 2 (2) Rack D 2 (2)	SENSOR 2 STATION RACK D 2	Center Electronic	MAIN AC BUS A (ϕA 115 Vac)
Rack E 2 (2) Rack G 1 (2)	RACK E 2 AND G 1	Center Electronic	MAIN AC BUS A (ϕA 115 Vac)
Right (1) Observer Left (1) Observer	115/200 VOLT LH & RH OBS STA	Aft Electronic	MAIN AC BUS A (3ϕ 115 Vac)
Work Bench (2) Rack H 1 (2)	WB & RACK H 1	Aft Electronic	MAIN AC BUS A (ϕA 115 Vac)
Lavatory (M 134 razor)	LAV ϕ A	Aft Electronic	MAIN AC BUS A (ϕA 115 Vac)
Right (1) Observer Left (1) Observer	LH & RH OBS STA	Aft Electronic	MAIN DC BUS (28 volt)
Dinette (2) Lower Fuselage (1)	DINETTE & LWR FUS	Aft Electronic	MAIN AC BUS A (ϕB 115 Vac)
Galley (2)	GALLEY & RADIANT HEATER (1) GALLEY OUTLETS (3)	Main Load Center Aft Electronic	MAIN AC BUS B (3ϕ 115 Vac)

Figure 1-34. Utility and Service Outlets

BOMB BAY DOOR SYSTEM.

The bomb bay doors are actuated by the No. 1 and No. 2 hydraulic systems. Hydraulic system No. 1 actuates the left bomb bay door and the No. 2 hydraulic system actuates the right bomb bay door. (See figure 1-35.) Both bomb bay door actuating cylinders are linked together so that if one hydraulic system fails the remaining system will operate both doors.

A reservoir and a handpump are provided for opening or closing of the bomb bay doors in the event both hydraulic systems fail. During normal operation, the bomb bay doors are opened or closed by routing No. 1 and No. 2 hydraulic system pressure through a dual control valve to the door actuating cylinders. This valve is operated by a two-position, OPEN-CLOSE switch located on the pilot armament control panel.

WARNING

Do not open or close bomb bay doors with personnel or equipment in the immediate vicinity of the bomb bay. Do not enter bomb bay without first verifying that bomb bay safety pin is installed and ensuring that the cable connecting the safety pin and door actuator is taut. Ensure that a lookout is posted in front of the aircraft to visually check bomb bay is clear when opening or closing the doors. Do not pull bomb bay circuit breakers after opening or closing bomb bay doors.

CAUTION

All personnel approaching the bomb bay area must be aware of the potential for air multiplier assembly damage as a result of blocking the air intake with caps or other foreign matter.

BOMB BAY DOOR GROUND SAFETY PIN MECHANISM.

A roller is added at the bottom of the bomb bay door control valve for ground safety. The roller is mounted on a lever. The actuation of the lever moves the roller under the bottom of the valve spool, locking the valve in the doors open position. A cable is attached to the top of the lever and extends through the bomb bay forward bulkhead to another lever, mounted in a bracket on the lower forward face of the bulkhead. The lower lever and bracket are designed to accept a 917048-101 ground safety pin when the lever is actuated to position the mechanism in the doors-open position. A small door is provided in the fuselage skin, on the lower left side of the aircraft at fuselage station 312, to permit insertion of the safety pin.

FLIGHT INSTRUMENTS.

PITOT-STATIC SYSTEM (Figure 1-36).

The pitot-static system consists of the pitot heads and associated plumbing which supply ram air (pitot pressure) to the indicated airspeed indicators and the true airspeed transducer; and the static ports and plumbing which transmit static air pressure to the airspeed indicators, autopilot air data sensor or barometric altitude control(s)*, true airspeed transducer, altimeters, vertical speed indicators (rate of climb), and cabin pressure controller. Static pressure is also applied to the APQ-107 radar altitude warning system(s).

Two electrically heated pitot heads are mounted symmetrically on either side of the lower forward fuselage. The left (pilot) pitot head supplies pressure for the pilot airspeed indicator only. The right (copilot) pitot head is connected to the copilot airspeed indicator, the true airspeed transducer and, on earlier aircraft,** to the air data sensor. For anti-icing purposes, the pilot pitot tube receives power (ac) from the flight essential ac bus through a circuit breaker marked PITOT HEATER-LEFT at the forward load center. The RH PITOT HTR (copilot) circuit breaker at the forward load center receives power through the ac forward lighting transformer bus. Power to heat the pitot heads is controlled by a two-position switch located on the lower (windshield heat) portion of the anti-icing control panel. Caution lights, adjacent to the switch, are illuminated when current to the heater is interrupted with the switch in the ON position.

The static system consists of two (four)* dual port (or balanced) and three (two)* single-port systems. One dual-port system furnishes static pressure to the pilot flight instruments only (airspeed, altimeter, vertical speed indicator). The other dual-port system furnishes static pressure to the copilot flight instruments and navigator altimeter, the APQ-107 radar altimeter warning system (RAWS), the AAU-28A transmitter altimeter, and to the true airspeed transducer. On later aircraft,** a third dual-port

*Aircraft BUNO 156514, 157310 and subsequent.
**Aircraft BUNO 156507 through 156513 and 156515 through 156530.

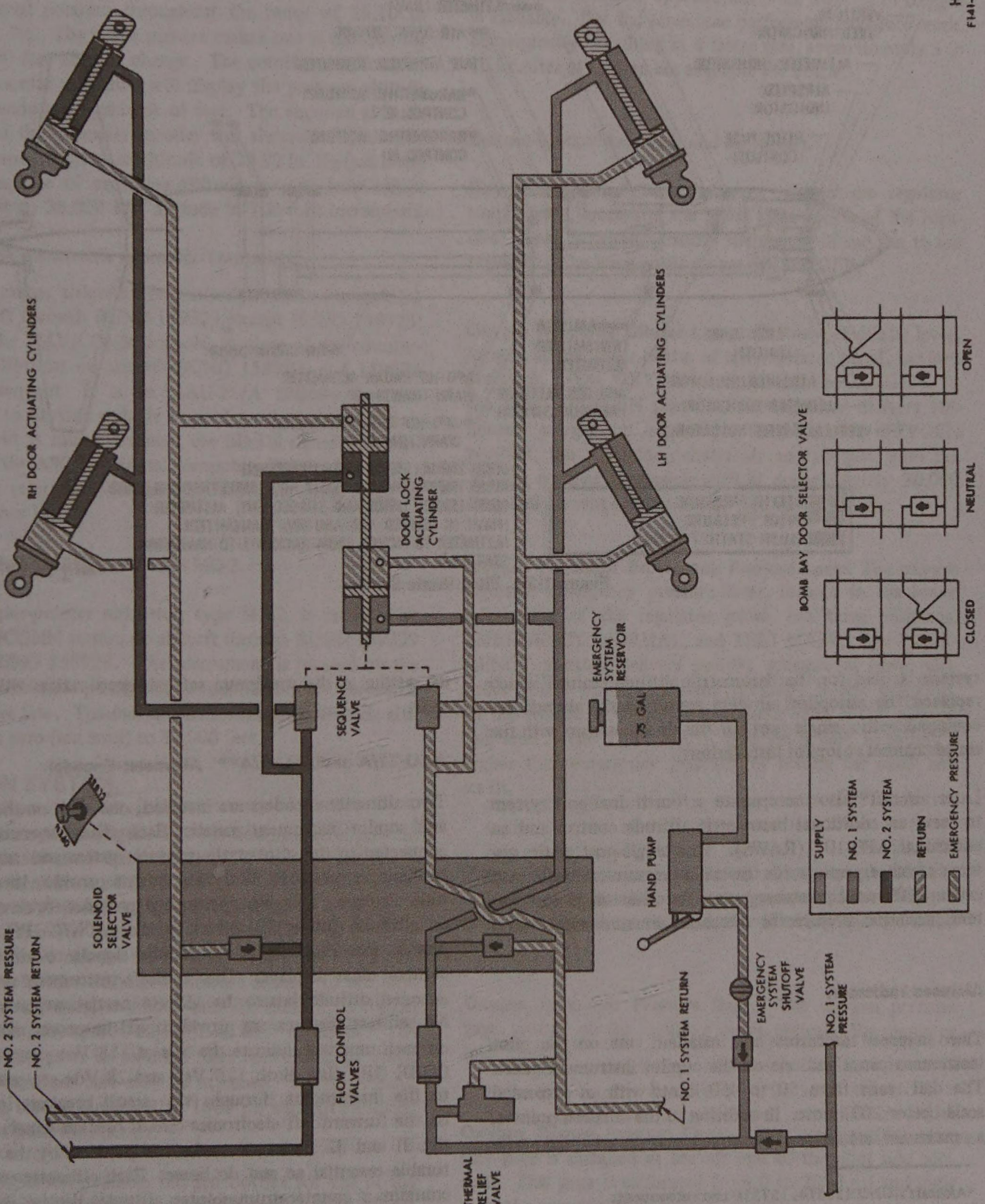
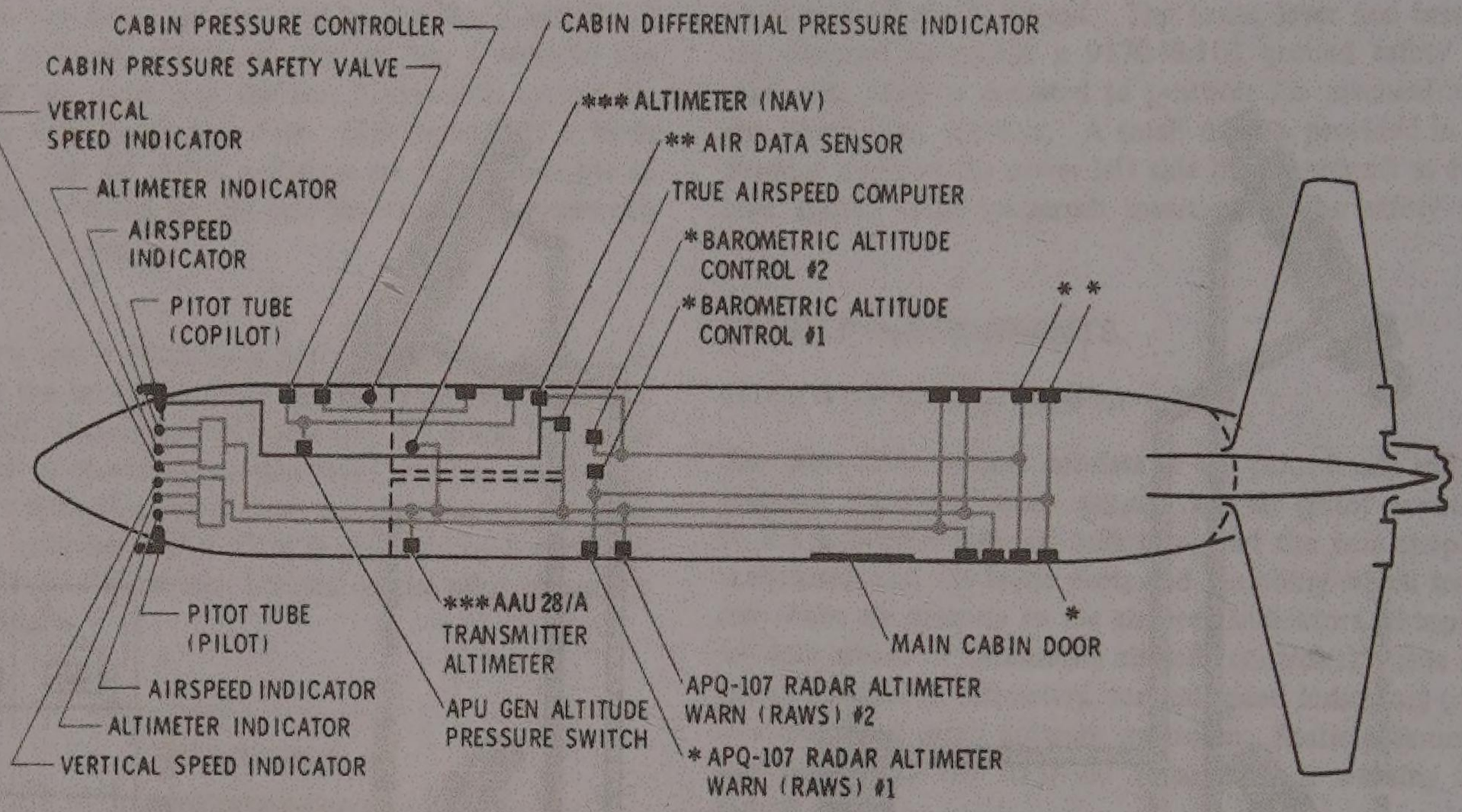


Figure 1-35. Bomb Bay Door Hydraulic System

PITOT - STATIC SYSTEM



*BUNO 156514, 157310 AND SUBSEQUENT
**BUNO 156507 THROUGH 156513 AND 156515 THROUGH 156530
***BUNO 158928, 159503 AND SUBSEQUENT, ALTIMETER (NAV) IS DELETED AND AAU 28/A TRANSMITTER ALTIMETER IS MOVED FROM RACK D-3 TO NAV/COMM STATION

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Figure 1-36. Pitot-Static System

system is used for the barometric altitude control which replaced the autopilot air data sensor (early aircraft are equipped with a single port for the air data sensor with the single channel autopilot installation).

Later aircraft* also incorporate a fourth dual-port system to serve an additional barometric altitude control and an additional APQ-107 (RAWS). One single-port static system furnishes pressure for the cabin pressure controller and cabin differential pressure gage. The other single-port system furnishes pressure for the cabin pressure safety valve.

Airspeed Indicator.

Two airspeed indicators are installed, one on the pilot instrument panel and one on the copilot instrument panel. The dial reads from 50 to 450 knots with an expanded scale below 200 knots. In addition to the airspeed pointer, a maximum safe airspeed pointer is incorporated that varies its setting as the maximum safe airspeed varies with altitude.

AAU-21/A or AAU-32/A Altimeter-Encoder.**

Two altimeter-encoders are installed, one each on the pilot and copilot instrument panels. Each altimeter-encoder is connected to the pitot-static pressure system and measures ambient air pressure. Both instruments provide visual altitude displays. The pilot instrument provides for an encoded altitude (mode C) output to the APX-72 IFF transponder for transmission of altitude signals to air traffic control radar displays. The copilot's instrument supplies encoded altitude data to the ASN-84 inertial navigation set. No self-test features are provided but the power monitors on each unit will indicate the loss of 115 Vac power via a CODE OFF flag. Both 115 Vac and 28 Vdc are provided to the instruments through two circuit breakers located on the forward left electronics circuit breaker panel, above the B1 and B2 electronics racks, and powered by the monitorable essential ac and dc buses. Each altimeter-encoder contains a counter-drum-pointer altitude display, integral red and white lighting, a barometric setting displayed by a

*Aircraft BUNO 156514, 157310 and subsequent.
**Aircraft BUNO 160283 and subsequent.

digital counter, and servo driven encoder whose position corresponds to the altitude displayed when the barometric setting is at 29.92 inches of mercury (in. Hg). The setting system, controlled by a knob, permits the altimeter display to be adjusted to indicate zero altitude at any existing ground level pressure throughout the range of 28.10 to 31.00 in. Hg. The single pointer makes one revolution for each 1000 feet altitude change. The combined indications of the counter and drum will display the pressure altitude in thousands and hundreds of feet. The encoded altitude output of the altimeter-encoder will always be referenced to the standard pressure altitude of 29.92 in. Hg (sea level) and is capable of providing altitude outputs from minus 1000 feet to 38,000 feet altitude in 100-foot increments.

AAU-28/A Barometric Altimeter-Transmitter.

The barometric altimeter-transmitter is installed in rack D3 on aircraft through BUNO 159329 except BUNO 158928; and on the NAV/COMM console, in place of the counter-pointer altimeter on aircraft BUNO 158928, and 159503 and subsequent. It is an AAU-21/A altimeter-encoder modified to provide a single or dual synchro output signal. The output is routed through the SD/DS signal data converter to the ASQ-114 digital computer. This analog output is always referenced to the standard pressure altitude of 29.92 inches Hg.

Counter-Pointer Altimeter Type MC-2.

The counter-pointer altimeter, type MC-2, is provided at the NAV/COMM station on aircraft through BUNO 159329 except BUNO 158928. The instrument is located on the upper instrument panel and is connected to the static air pressure line. The instrument measures barometric altitude from zero (sea level) to 80,000 feet.

OXYGEN SYSTEM.

The oxygen system (figure 1-37) is designed to supply an active flight crew of three members for approximately 3½ hours at an altitude of 25,000 feet. Oxygen is supplied from three high-pressure (1800 psi) bottles through three regulators, one for each flight crewmember. A common manifold allows oxygen to be evenly furnished from one or all three bottles through a pressure reducer to the oxygen regulators. Smoke masks, one for each flight station crewmember, are stored adjacent to each regulator. The system incorporates an external filler connection to which a portable oxygen cart may be attached. By this means, the bottles can be recharged to 1800 psi without removing the bottles from the aircraft.

In addition, seven portable oxygen bottles for use of the tactical crewmembers are stowed in the cabin area. These bottles are equipped with diluter-demand regulators and smoke masks. Capacity of the bottles is 96 cubic inches under 1800 psi of pressure. With the regulator set for 100 percent oxygen and with the user experiencing little or no physical exertion, approximately 22 minutes of oxygen is available. For the same man performing moderate work, consequently breathing at a faster rate, approximately 5 to 10 minutes of oxygen are available per bottle.

Oxygen-System Regulator and Indicators.

Oxygen Regulator Supply Lever. An oxygen regulator supply lever, located in the lower right corner of the regulator panel, is used to control the supply of oxygen to the regulator. The lever positions are ON and OFF.

Oxygen Regulator Diluter Lever. The oxygen diluter lever, located at the lower center of the regulator panel, has two positions, 100% OXYGEN and NORMAL OXYGEN. In the 100% OXYGEN position, the regulator delivers 100 percent oxygen on inhalation. In NORMAL OXYGEN position, the regulator delivers air and oxygen, with the oxygen content increasing until at approximately 30,000 feet, 100 percent oxygen is delivered on inhalation.

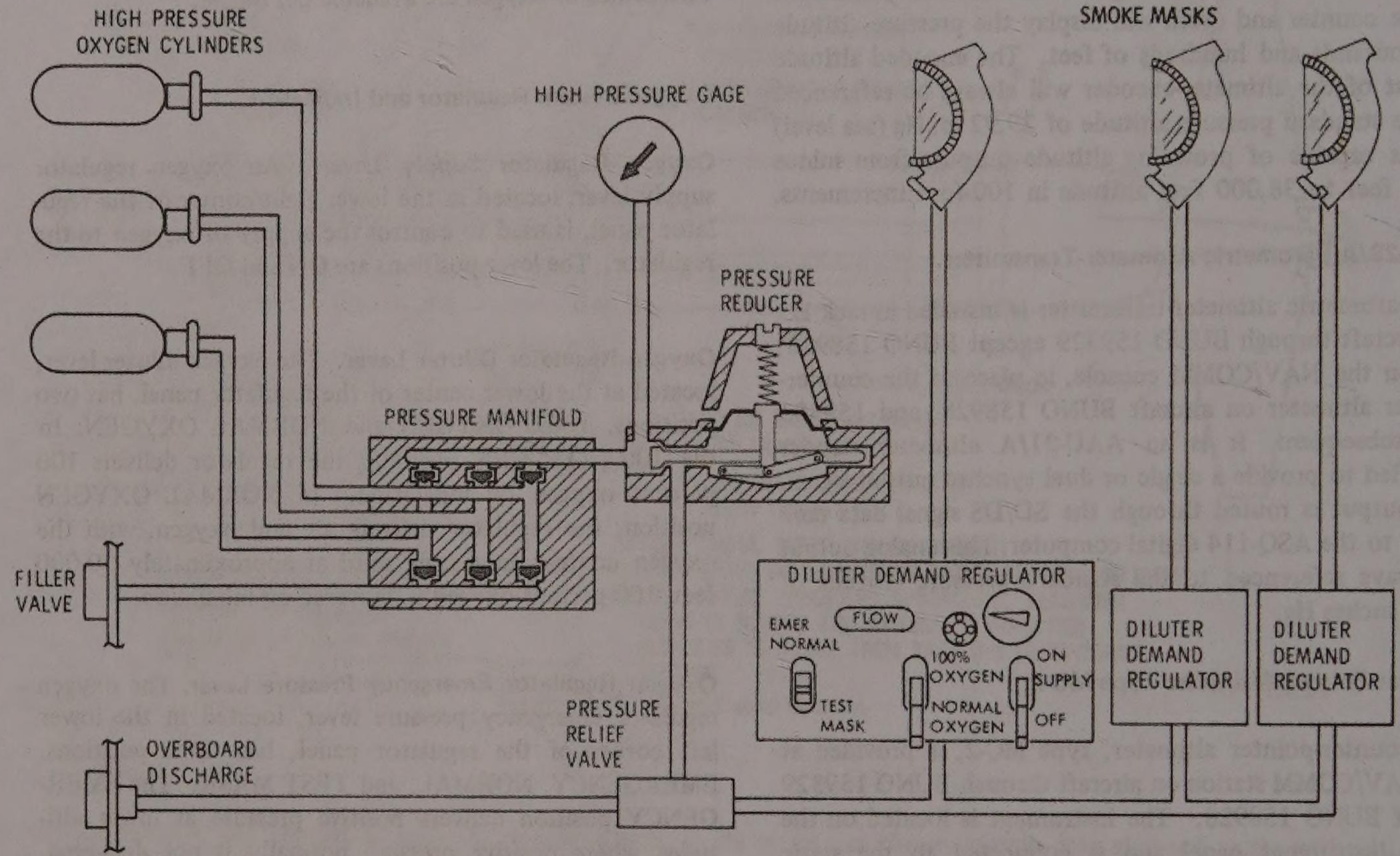
Oxygen Regulator Emergency Pressure Lever. The oxygen regulator emergency pressure lever, located in the lower left corner of the regulator panel, has three positions. EMERGENCY, NORMAL, and TEST MASK. The EMERGENCY position delivers positive pressure at lower altitudes where positive pressure normally is not delivered. In the NORMAL position, the diluter valve is the controlling lever. The TEST MASK position is used to supply a higher than emergency pressure for testing the mask and its fit.

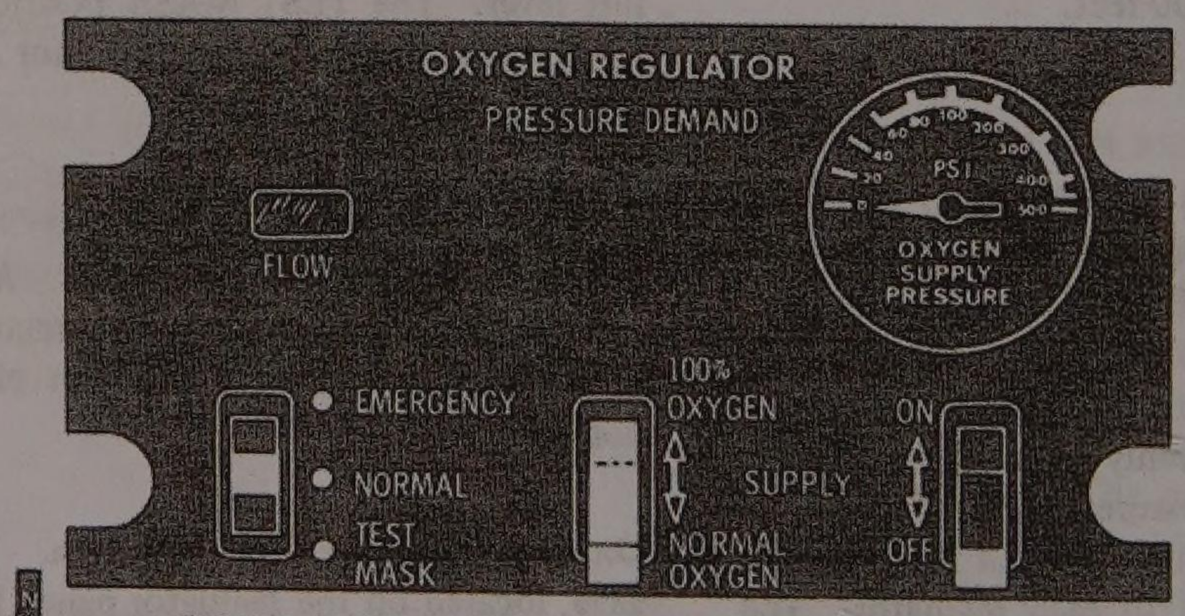
Oxygen Regulator Flow Indicator. An oxygen-flow blinker indicator is installed on each regulator panel. Oxygen flow is indicated by the indicator blinking during inhalation.

Oxygen Regulator Pressure Gage. The oxygen pressure gage, located on the regulator panel, indicates the regulator inlet pressure.

Oxygen System Pressure Gage. An oxygen system pressure gage is installed at the aft end of the pilot side console. This gage is calibrated from 0 to 2000 psi and indicates the pressure in the oxygen system.

OXYGEN SYSTEM





NEW

TYPICAL-FLIGHT STATION OR PORTABLE OXYGEN REGULATOR

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Figure 1-37. Oxygen System

AIR CONDITIONING AND PRESSURIZATION SYSTEM.

The air conditioning and pressurization system provides crew environment control and electronic equipment cooling both in flight and on the ground. Bomb bay heating and the electronic equipment rack overheat warning systems are also described.

The normal mode of operation of the air conditioning and pressurization system employs two engine-driven compressors (EDCs), mounted on engines No. 2 and No. 3. Compression heats the air to more than 200°F above ambient. Heated, compressed air is ducted through two air-cycle cooling units in the nosewheel well, and thence into the flight station and cabin (see figure FO-4). The cooling units are capable of cooling the air to substantially below freezing. Three valves (referred to in the figure as A, B, and C) automatically bypass or partially bypass the cooling units to send hot, warm, or cold air into the cabin and flight station.

A second mode of operation employs the APU and an air multiplier package to supply the air cycle cooling units with heated, compressed air, which is then cooled as described in the foregoing paragraph. Not available in flight, this is the normal mode of operation for ground air conditioning.

A ground connection downstream of the air-cycle cooling units introduces air from an external air conditioning truck directly into the distribution system.

An auxiliary ventilation system supplies unpressurized ambient air on the ground. It may also be used during unpressurized flight to remove smoke or fumes from the flight station. With this system, ram air is ducted directly into the distribution system, bypassing the air-cycle cooling units.

AIR CONDITIONING DISTRIBUTION AND EXHAUST SYSTEMS.

Separately controlled distribution systems provide fresh, conditioned air to the flight station and the cabin (see figure 1-38). An outlet over the entrance supplies the flight station. In addition, footwarmers are provided for both pilots with mechanically connected on-off controls located outboard under the respective instrument panels. An overhead longitudinal duct delivers cabin air to louvered outlets in the ceiling, and individually controllable (on-off) gaspers are provided at the various crew stations and rest areas.

The exhaust system draws cabin air through the electronic equipment cabinets and the electrical load center and dumps it overboard through the outflow valve. Modulation of the ouflow valve controls pressurization in the flight station and cabin. Some air is also exhausted through vents provided in the lavatory and galley to expel fumes and odors. A manually operated valve, provided in the galley vent, should be closed except during cooking operations.

Cabin Air Compressors.

Mounted on engines 2 and 3, are single-stage, centrifugal-type compressors coupled directly to the accessory drive train. An electrically operated disconnect mechanism enables the flight crew to disconnect the compressor from the engine. Compressed air output is controlled by inlet flow control vanes which regulate the volume of air entering the compressor on the basis of signals received from one element of a dual pitot-static probe mounted in the compressor discharge duct, that is, as altitude increases, the pitot-static element senses lowering pressure and causes the inlet flow vanes to admit more air for compression. The other element of the pitot-static probe senses excess output pressure and in response operates a dump valve to spill or dump the compressor output. The dump valve thus is used to bleed off excess air caused by surges in the system and to protect it when excessive demands are made upon it. It also dumps compressor output automatically when the APU air multiplier package is supplying the air conditioning system. A switch in the flight station may be operated to dump cabin air compressor output manually.

Firewall Shutoff Valve.

Located in the ducting in the leading edge of the wings are electrically actuated firewall shutoff valves which close whenever the APU is supplying the air conditioning system and when cabin air compressor output is being dumped.

APU Air Multiplier Package.

The APU air multiplier package ordinarily supplies air for the air conditioning system on the ground. The raw pneumatic output of the APU is too hot and of insufficient volume to handle air conditioning system requirements. Therefore, APU output is routed through the air multiplier package where it drives a turbine; the turbine drives a compressor which draws in and compresses ambient air.

AIR CONDITIONING & PRESSURIZATION

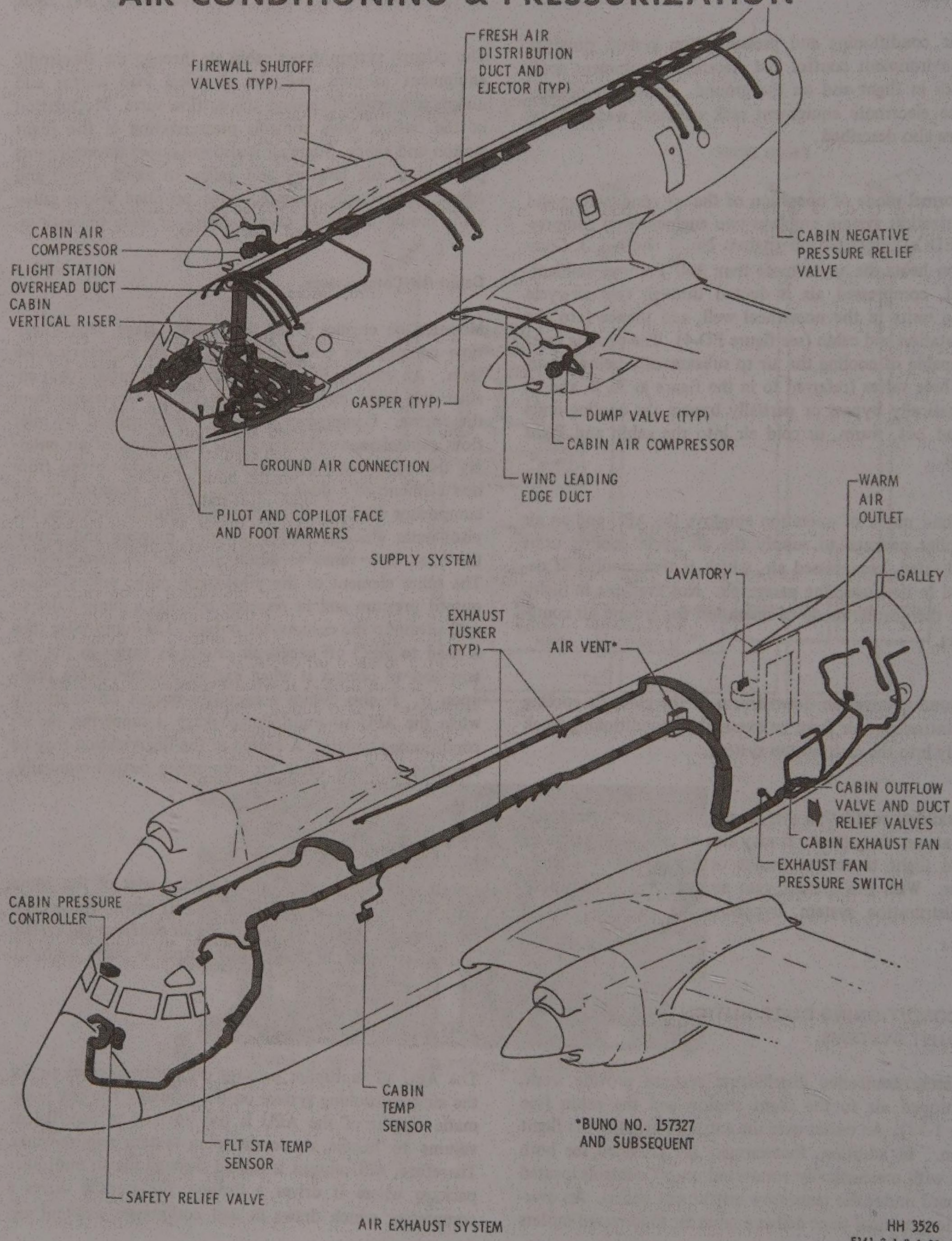

Figure 1-38. Air Conditioning and Pressurization

APU air, partially cooled by its work of turning the turbine, is augmented by the compressed ambient air and both are ducted into the air cycle cooling systems.

Air Cycle Cooling Systems.

Two, two-stage air cycle cooling units are installed in the nosewheel well. The unit on the left receives the output of the No. 3 engine-driven cabin air compressor (or half the APU air multiplier package output) and supplies the main cabin. The unit on the right side of the nosewheel well receives the output of the cabin air compressor driven by the No. 2 engine; the output of the right unit is divided about evenly between the flight station and the cabin. Each unit routes air through a primary heat exchanger, a compressor, a secondary heat exchanger, an expansion turbine, and thence into the cabin or flight station. The heat exchanger coils are cooled by ram air in flight and by air from an electrically driven fan on the ground (turned on by the ground air conditioning switch). The compressor is driven by the expansion turbine.

AIR CONDITIONING AND PRESSURIZATION CONTROL SYSTEM.

Pressurization Control System.

Pressurization is controlled automatically by an isobaric-differential system that consists essentially of the pressurization controller and the outflow valve in the lower rear fuselage. The isobaric system modulates the outflow valve to limit exhaust airflow to the amount necessary to maintain cabin pressure equivalent to the altitude selected on the pressurization controller. As the aircraft climbs, the difference between cabin and outside pressure increases. When this pressure difference reaches 13.3 in. Hg (11.0 in. Hg in aircraft not incorporating AFC 341), the differential system overrides the isobaric system, modulating the outflow valve to maintain the limit pressure differential rather than the selected equivalent cabin altitude (see figure 1-39). A pressure relief valve under the copilot's seat is provided to prevent a dangerous buildup of cabin pressure in the event of malfunction of the differential system. The pressure relief valve is set at 13.9-14.4 in. Hg. (11.7-12.2 in aircraft not incorporating AFC 341.)

CAUTION

Cabin differential pressure must be at or below 9 in. Hg prior to opening pyrotechnic pistol porthole door.

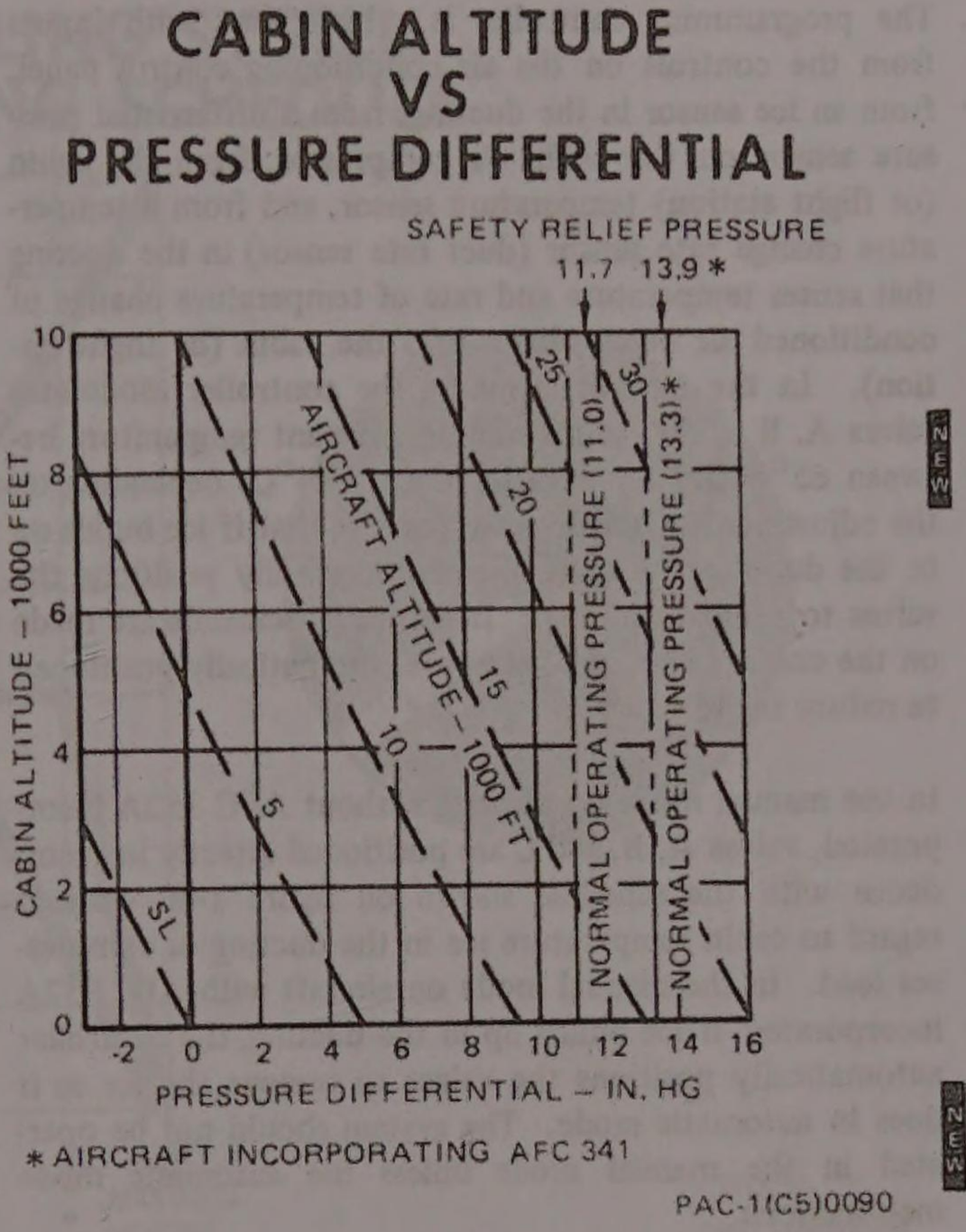

Figure 1-39. Cabin Altitude vs Pressure Differential

Temperature Control System.

Two independent temperature control systems are provided; one for flight station and one for the cabin. Both systems are completely automatic; however, manual control systems are provided for backup. Each system consists primarily of the controls on the air conditioning panel, a programming controller (in the forward electrical load center), and three servo-operated valves in the ducting which control the flow of air. The valves are shown in figure FO-4 (valves A, B, and C).

When valve A is open, an alternate route is provided for air to bypass the secondary heat exchanger and expansion turbine, sending warm air into the cabin and flight station. Valve B is open for cooling; when it is closed the secondary heat exchanger is bypassed, and all air must flow through valve A into the system. Valve C provides an alternate route for hot air from the compressor to bypass the cooling system entirely. The position of valves A, B, and C are modulated by action of the programming controller.

The programming controller is a black box with inputs from the controls on the air conditioning control panel, from an ice sensor in the ducting, from a differential pressure sensor on the cabin air compressor, from the cabin (or flight station) temperature sensor, and from a temperature change rate sensor (duct rate sensor) in the ducting that senses temperature and rate of temperature change of conditioned air being blown into the cabin (or flight station). In the automatic mode, the controller modulates valves A, B, and C to maintain a constant temperature between 65°F and 85°F (18.3°C to 29.4°C) depending on the adjustment of the selector (except that if ice builds up in the ducting, the controller automatically positions the valves to remove the ice). If excessive demands are made on the compressors, the valves are automatically positioned to reduce the load.

In the manual mode on aircraft without AFC 352A incorporated, valves A, B, and C are positioned directly in accordance with the schedule shown on figure 1-40 without regard to cabin temperature ice in the ducting or compressor load. In the manual mode on aircraft with AFC 352A incorporated, if ice builds up in the ducting, the controller automatically positions the valves to remove the ice as it does in automatic mode. The system should not be operated in the manual mode unless the automatic mode malfunctions.

Air Conditioning and Pressurization System Controls and Indicators.

All controls and indicators for the air conditioning and pressurization system will be found on a control panel on the flight station overhead panel illustrated in figure 1-41.

Temperature Selectors. Two temperature selectors, placarded CABIN and FLT STA, provide independent temperature control for the cabin and flight station. A push-pull knob on the dial is used to switch temperature control mode from manual to automatic, and the word AUTO or MAN appears on the face of the dial to indicate the temperature control mode selected. The knob may be rotated to select a warmer or cooler temperature. In the automatic mode, the moving index mark on the periphery of the dial provides an indication approximately equivalent to the temperature selected. The center needle indicates the setting of valves A, B, and C (figure 1-40) being utilized to achieve or maintain the selected temperature. When the system is in automatic and the index mark is in the center of its range, a temperature of approximately 75°F will be maintained. In the manual mode, valves A, B, and C are positioned directly as shown in figure 1-40. It will be necessary to adjust the control knob as altitude and outside air temperature change, and no ice or compressor overload protection* are provided. Both selectors are powered through circuit breakers on the monitorable essential ac bus panel.

Temperature Selector Switch and Gage. The air conditioning temperature gage is marked from 0° to 60°C and displays any of the three temperatures selected by the TEMP SELECTOR knob located adjacent to the indicator. The three temperatures which may be monitored are flight station conditioned air temperature (FLT STA COND AIR), cabin conditioned air temperature (CABIN COND AIR), and cabin exhaust air temperatuer (CABIN TEMP). The electrical circuit receives power from the monitorable essential ac bus in the forward load center.

Refrigeration Overheat Light. Two yellow signal lights, one for each air cycle cooling unit, reading REFR OVHT are located on the air conditioning panel (figure 1-41). The illuminated light indicates (1) a closed thermal sensor switch (166°C) sensing an overheat condition at the output side of the air cycle machine compressor, and (2) that temperature in the affected duct has exceeded safe limits. During ground operation, the air conditioning system and EDC will dump, and remain dumped until the overheat condition has been removed. Operation of the ground air conditioning system can then be continued after cycling the GRD AIR COND switch and by selecting MAN 2 dot (or warmer) with the temperature programmer.

Cabin Exhaust Fan Switch and Signal Light. Cabin air is drawn through the electronics compartments by the cabin exhaust fan and exhausted overboard through the outflow valve. Power is furnished to the fan through a circuit breaker on the main ac bus B panel and to the switch through a circuit breaker on the main dc extension panel. Guarded to ON, the switch has an OFF position that should not be used if the electronic equipment is operating. A light, located adjacent to fan switch, illuminated FAN OUT indicating exhaust fan failure or lack of air flow.

Ground Air Conditioning Switch. The ground air conditioning switch has multiple electrical connections to open the APU air multiplier shutoff valve and introduce APU air into the air multiplier package, dump cabin air compres-

*Automatic ice or compressor overload protection is provided on aircraft incorporating AFC 352A.

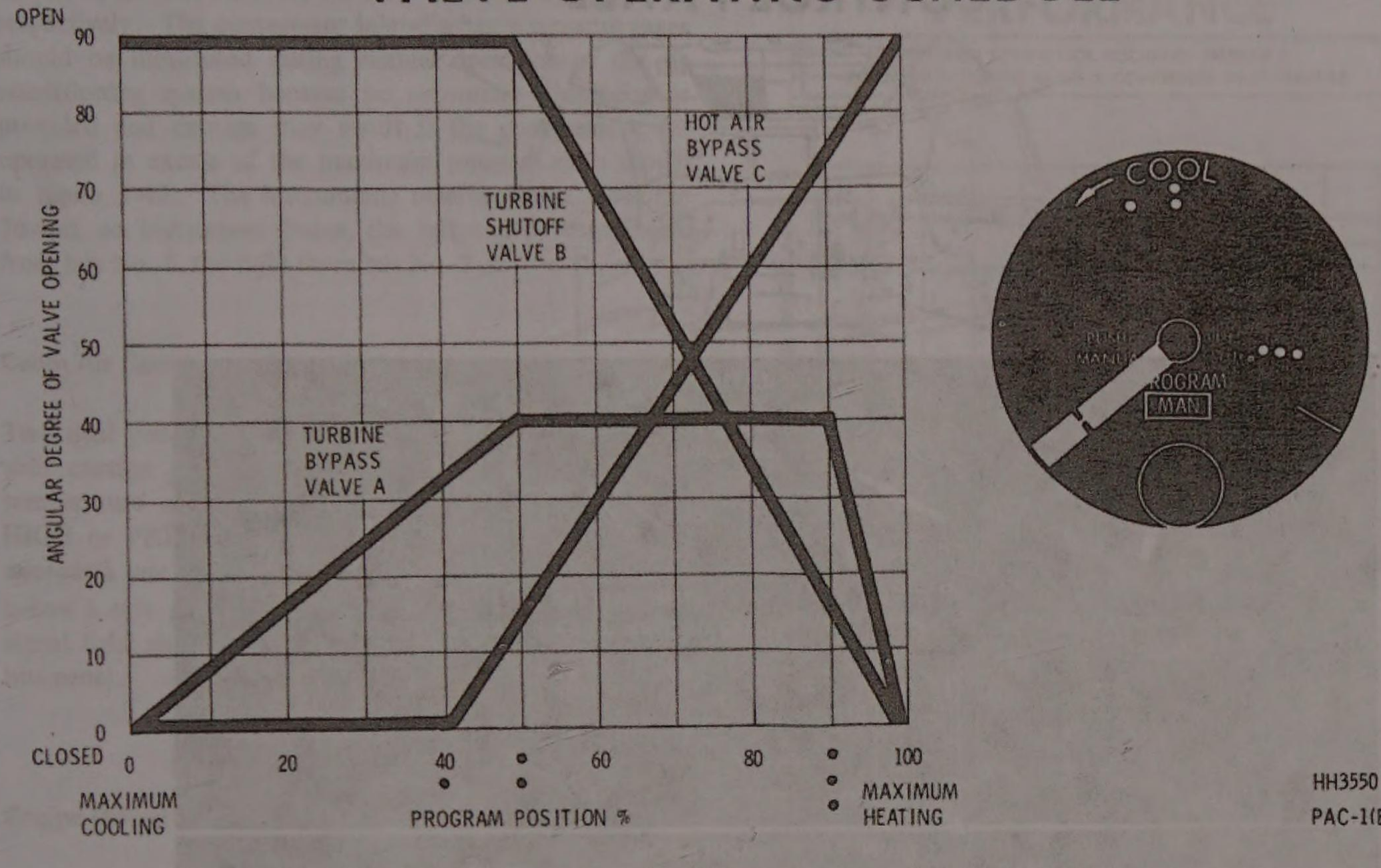

Figure 1-40. Air Cycle Cooling System Valve Operating Schedule

sor output, close the firewall shutoff valves, close the auxiliary ventilation (AUX VENT) valve, and energize the air cycle cooling unit blowers to cool the heat exchanger coils.

The heat exchanger blowers are powered through circuit breakers on main ac bus B panel; the various ground air conditioning switch functions are powered through circuit breakers on the monitorable essential dc bus panel.

CAUTION

During all ground operations, sufficient cooling air should be provided to the aircraft to maintain the cabin ambient air temperature below 27°C (80°F). If operational requirements make it necessary to operate avionics without cooling air, it is important to: (1) keep the cabin door and hatches closed; (2) keep avionics racks doors closed; and (3) keep cabin exhaust fan running. If cabin ambient temperature exceeds 27°C (80°F), selected avionics should be turned off to avoid reductions in reliability and operational readiness.

APU Air Override Switch.

Labeled ON and OFF, the APU air override switch in the ON position disables the ground air conditioning switch functions that select APU air multiplier package air for air conditioning; the APU air multiplier valve is closed, the firewall shutoff valves are opened, and cabin air compressors air is used for air conditioning. The switch functions are powered through circuit breakers on the monitorable essential dc bus panel.

Compressor Inlet-Discharge Pressure Gages.

An inlet-discharge pressure gage is provided for each cabin air compressor. During APU ground operation the gages

AIR CONDITIONING & PRESSURIZATION CONTROL PANEL

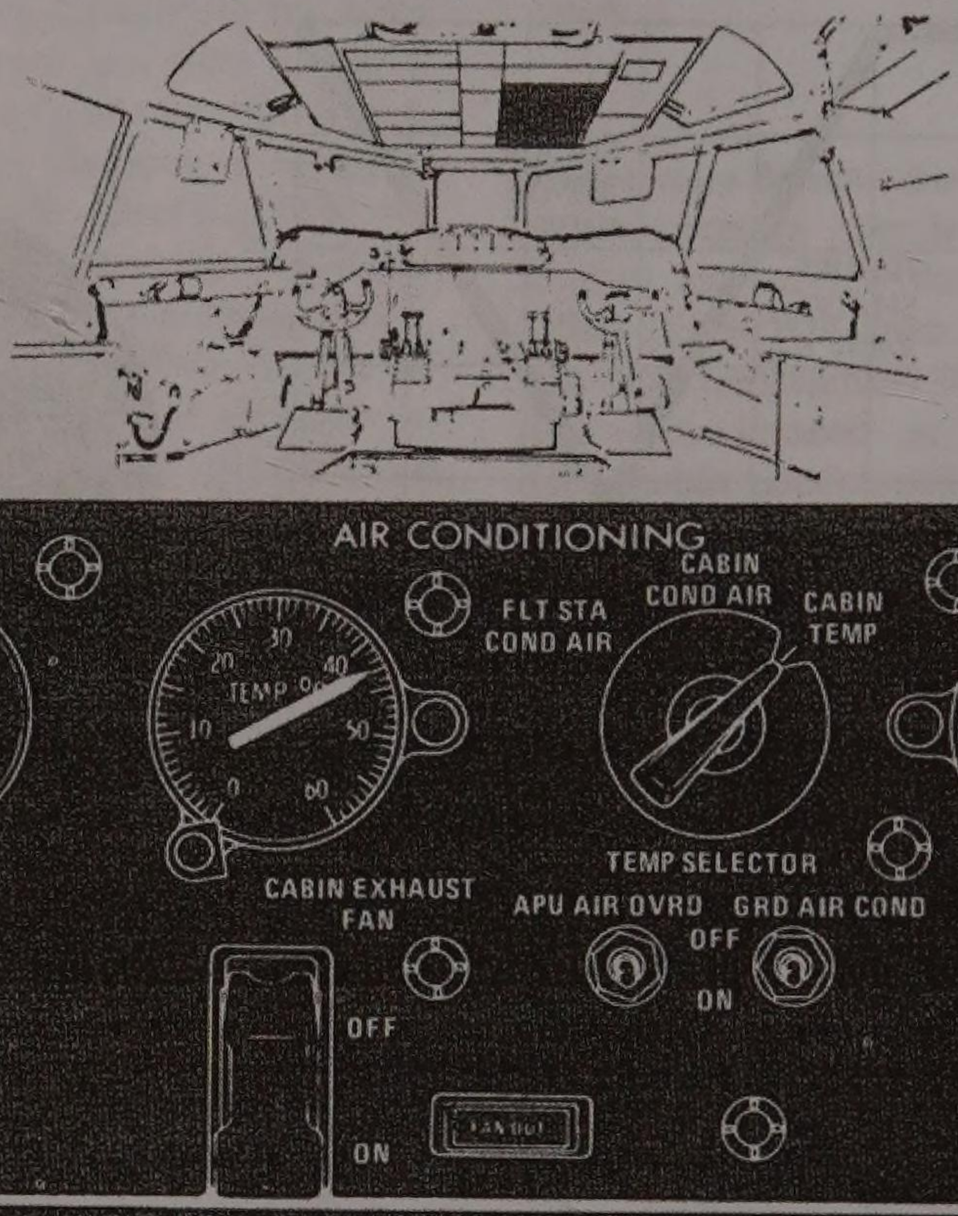

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Figure 1-41. Air Conditioning and Pressurization Control Panel

indicate air multiplier package loading. The dial face of each indicator is graduated from 0 to 85 in. Hg. Each dial has two pointers, I and D, for inlet and discharge pressure, respectively. The compressor inlet-discharge pressure gages should be monitored during manual operation of the air conditioning system because no automatic protection is provided and damage may result if the compressors are operated in excess of the maximum pressure ratio shown in figure 1-42. The instruments receive power from the 26-volt ac instrument buses, the left engine compressor from bus No. 1, the right from bus No. 2.

Cabin Air Compressor Signal Lights.

Two dual yellow lights, placarded LEFT and RIGHT, provide caution indication of the cabin air compressor oil temperature and pressure. The lights illuminate TEMP HIGH or PRESS LOW, as applicable, if oil temperature exceeds a safe value or if oil pressure in a compressor falls below a safe pressure. The lights are powered through the signal light circuit breaker on the monitorable essential dc bus panel.

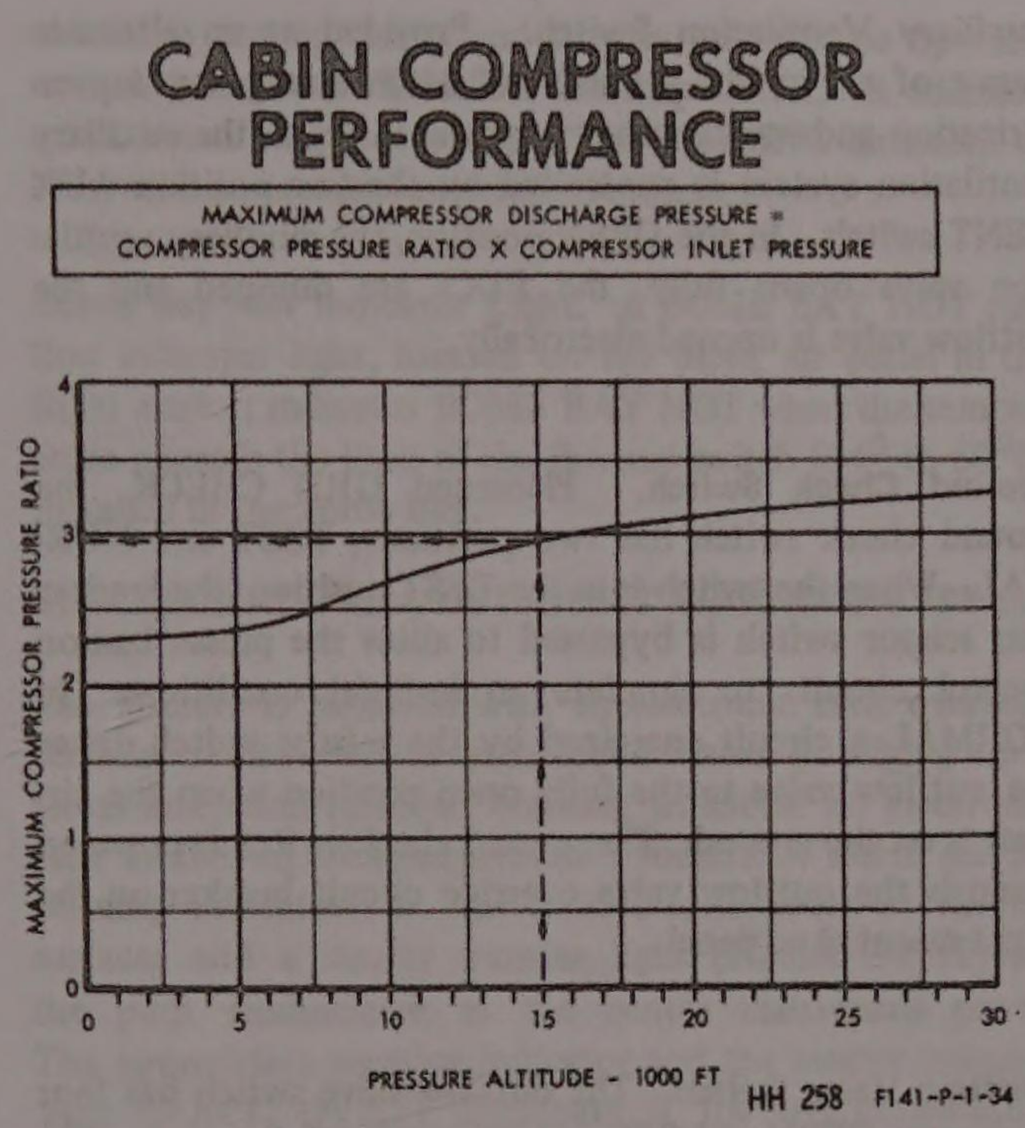


Figure 1-42. Cabin Compressor Performance

Engine-Driven Compressor Dump Switches.

A dump switch, placarded DUMP and NORMAL, is provided for each engine-driven cabin air compressor. When the switch is in DUMP, the firewall shutoff valve is closed and the cabin air compressor output is dumped overboard. Power is supplied through the EDC DUMP circuit breaker on the monitorable essential dc bus panel.

Cabin Air Compressor Disconnect Switches. A disconnect switch is provided for each cabin air compressor. The switches are guarded in NORMAL and have a DISCONNECT position. DISCONNECT disconnects the compressor from the engine by applying power from the EDC DISCONNECT circuit breaker on the monitorable essential dc bus panel to the solenoid-operated unit. The DISCONNECT position should not be selected unless the compressor is operating because the compressor will be damaged.

Cabin Pressurization Controller. The cabin pressure controller operates pneumatically and is connected by air line to the outflow valve. The cabin pressure controller modulates the position of the outflow valve to hold a constant cabin altitude (isobaric), to limit differential pressure to a maximum 13.3 in. Hg (11.0 in. Hg in aircraft not incorporating AFC 341) (differential), and to limit rate of pressure change when the cabin altitude setting is changed. A knurled wheel on the left side of the controller, placarded BAR CORR, is used to apply a barometric altitude setting to the controller. The altimeter setting is revealed in the left window. The right window indicates the cabin altitude setting. The setting may be varied by operation of a knurled wheel placarded CABIN ALT on the right side of the controller. A rate selector knob in the lower portion of the controller controls cabin altitude change rate during isobaric operation. Rate of change is controllable within a range between 200 and 2000 feet per minute.

Cabin Vertical Velocity Indicator. The cabin vertical velocity indicator is graduated in feet per minute from 0 to 2000 (up and down). When cabin pressure is changing, the change is displayed as an equivalent vertical velocity.

Cabin Differential Pressure Indicator. The cabin differential pressure indicator displays the difference in pressure between cabin and outside air. Dial marking is from 0 to 20 in. Hg.

Cabin Altimeter. The cabin altimeter displays the existing cabin pressure in terms of pressure altitude.

Auxiliary Ventilation Switch. Provided as an alternate source of air on the ground and as an emergency depressurization and smoke removal system in flight, the auxiliary ventilation system is controlled by the two-position AUX VENT switch. In the OPEN position, the auxiliary ventilation valve opens fully, the EDCs are dumped and the outflow valve is opened electrically.

Ground Check Switch. Placarded GRD CHECK, the ground check switch has two positions, TEST and NORMAL. When the switch is in the TEST position, the landing gear scissor switch is bypassed to allow the pressurization control circuits to simulate an in-flight condition. In NORMAL a circuit energized by the scissor switch drives the outflow valve to the fully open position when the aircraft is on the ground. The ground check switch is powered through the outflow valve override circuit breaker on the flight essential ac panel.

Outflow Valve Switch. The outflow valve switch has four positions; OPEN, CLOSE, AUTO, and off (center). The switch controls the outflow valve as follows:

OPEN–electrically drives the outflow valve to full open position, releasing cabin exhaust air and depressurizing the aircraft.

CLOSE–electrically drives the outflow valve to the full closed position, decreasing cabin altitude.

AUTO–electrically drives the outflow valve to a midrange position, allowing the cabin pressure controller to pneumatically control the position of the outflow valve in either isobaric or differential range.

Off (center)–the cabin pressure controller will pneumatically control the position of the outflow valve provided the outflow valve is in the midrange area (pneumatic control available) at the time the switch is placed to off (center). If outside the midrange area the outflow valve will stop and remain fixed as long as the switch is in the off position, unless the aux vent switch is moved to the OPEN position. The ground air sensing circuit opens the outflow valve electrically upon landing.

RADIANT HEATED PANELS.

Radiant heated floor and wall panels are provided at the crew stations, bunks, and galley areas to compensate for heat loss through the cabin structure. Automatic switching turns electric power to the panels on when cabin temperature reduces to 68°F and off when it rises to 80°F. The automatic monitoring system described in the electrical system description disables the radiant heating circuits when higher priority demands for electric power exist. Circuit breakers are provided on the main ac bus B panel in the main load center. On later aircraft* cabin exhaust air is provided through louvered grills to the dinette and ordnance areas replacing radiant floor and wall heaters in these areas.

GALLEY AND LAVATORY VENTURI.

Sonic venturis are installed in the lavatory and galley to vent odors overboard. A manual shutoff valve is provided in the galley to close the venturi.

Foot-Warmer Control.

Foot-warmer control knobs, one located below each pilot's instrument panel, control the flow of air from the footwarmer outlets forward of the rudder pedals. To increase the amount of airflow through the footwarmer push the knob, placarded FOOT AIR PUSH, forward. To decrease the footwarmer airflow, pull the knob aft.

Gasper Control.

Gasper outlets are installed at crew and rest stations throughout the aircraft. Gasper airflow is controlled by manually turning the control ring on the outer surface of the unit.

BOMB BAY HEATING SYSTEM.

A bomb bay heating system utilizing 14th stage engine bleed air has been installed. In addition, APU bleed air for ground heating of bomb bay is also available. These systems are to be used when carrying the MK-46 store. If the bomb bay temperature falls below a preset level (-3° to +2°C), a caution indicator light on the overhead engine bleed air panel, actuated by a low temperature sensor in the bomb bay, illuminates. This sensor also actuates the deicing master caution light on the center annunciator panel. Turning the bomb bay heat switch on the bleed air panel to ON, energizes a cycling thermostat which actuates a solenoid controlled pneumatic valve installed on a bleed air line tapped into the manifold outboard of the right fuselage valve. This allows the hot bleed air to flow from the right cross duct manifold when the No. 3 or No. 4 engine bleed air shutoff valve is opened. A cycling thermostat will maintain the bomb bay temperature between approximately +3° to +7°C by cycling the valve solenoid as required. When operating in very low OAT,

*Aircraft BUNO 157327 and subsequent.

the bomb bay temperature should be monitored when the system is initially turned on for an increase in bomb bay temperature. Failure of the cycling thermostat will be indicated by failure of the BOMB BAY COLD light to go out and failure of the bomb bay temperature to rise. If this occurs, the bomb bay heat switch can be placed in OVERRIDE position; this will bypass the cycling thermostat and send power directly to the valve solenoid. A thermal switch is also installed in the bomb bay which will illuminate another caution indicator light on the bleed air panel in the event that the allowable operating heat range is exceeded (+54°C to +60°C). This high temperature switch also illuminates the DEICING master caution light on the center annunciator panel. To assist in monitoring bomb bay temperature, a temperature selector switch position is provided on the bleed air panel which indicates bomb bay temperatures on the associated temperature indicator. The APU may be used to provide bleed air for bomb bay heating for ground operation only. The right bleed air isolation valve must be in the OPEN position to allow APU air flow to the bomb bay air distribution line. During engine start, the system is not automatically monitored, and it will be necessary to turn off the bomb bay heat switch to maintain proper manifold pressure. The system is powered by the extension main dc bus. A circuit breaker, labelled BOMB BAY HEAT & CONT, is located on the forward load center in the flight station.

Bomb Bay Heat Switch. A bomb bay heat switch located on the bleed air panel in the flight station has three positions: ON, OFF and OVERRIDE. The ON position energizes a cycling thermostat which actuates a solenoid and opens a pneumatic valve in the bleed air lines allowing hot bleed air from the engine or APU to enter the bomb bay for heating purposes. In OVERRIDE position, the thermostat is bypassed and the solenoid valve is opened to allow bleed air to flow into the bomb bay area without cycling control.

Bomb Bay Temperature Selector Switch and Temperature Indicator. A bomb bay temperature selector and a temperature indicator are located on the bleed air panel in the flight station and are used in conjunction with the wing leading edge temperature indicator switch. Placing the rotary switch to the BOMB BAY position, the bomb bay temperature can be monitored on the adjacent temperature (LEAD EDGE TEMP) indicator.

Bomb Bay Cold Indicator Light. A BOMB BAY COLD caution indicator light, located on the bleed air panel in the flight station, indicates BOMB BAY COLD when the temperature in the bomb bay falls below a preset (-3° to +2°C) low temperature value. If it remains on after activation of the bomb bay heat system, the cycling thermostat is not operating and the system must be operated manually in the OVERRIDE switch position. In addition, actuation of the sensor causes the DEICING indicator on the center instrument panel to illuminate.

Bomb Bay Hot Indicator Light. A BOMB BAY HOT caution indicator light, located on the bleed air panel in the flight station indicates BOMB BAY HOT when the temperature exceeds the limit of the thermal switch (54° to 60°C) installed in the bomb bay.

ELECTRONIC RACK OVERHEAT WARNING SYSTEM.

The aircraft is provided with an electronic rack overheat warning system which provides a visual (in-flight) or a visual and aural (ground) warning whenever an electronic rack attains an overtemperature condition. There are 20 warning indicators on the various rack doors or nearby surfaces and a master warning light (RACK OVHT) on the pilot annunciator in the center instrument panel. The appropriate warning indicator and the master warning light (RACK OVHT) illuminate if the overtemperature exceeds 135 ±3°F. Individual switches adjacent to the indicators are provided to extinguish the flight station RACK OVHT warning light, if desired. The individual RACK light remains illuminated and the toggle switch remains down until the sensor for that rack has cooled below 128°F. On the ground there is a horn located in the nosewheel well powered through the scissor switch that provides an aural warning whenever an overheat condition exists. A 15-minute repeat cycle timer is provided on the bulkhead behind the sensor 3 operator which causes the horn to discontinue operation when set. The toggle switch, when set on the ground, prevents the horn from sounding regardless of the timer setting. The horn reactivates when the timer runs out, provided the toggle switch is not set. The horn does not sound while airborne. Power for the system is provided through a rack overheat warning circuit breaker on the main dc bus located at the main load center. In the event of a main dc bus failure, the master (RACK OVHT) warning light on the pilot annunciator panel illuminates. In addition, all power to the various rack indicators and sensors is secured.

MK-8 MOD 8 ROCKET SIGHT.

An illuminated collimating reflector-type fixed sight which contains an illuminated fixed reticle image pattern is provided for rocket sighting. The sight is stowed at the base of the center control stand on the copilot's side. For use, the sight is installed in front of the pilot on the instrument panel glareshield. Operation of the sight is accomplished by turning on the sight switch and adjusting the rheostat

for proper illumination. A mounting bracket provides for mounting the sight to the aircraft and aligning the sight vertically and horizontally. The rocket sight light receives power from the SIGHT LIGHT circuit breaker on the forward lighting bus at the forward load center. The brilliance of the light is controlled by the SIGHT rheostat located on the flight station left outboard overhead panel. The sight illumination bulb has a dual filament; either of which may be selected on the FILAMENT 1-FILAMENT 2 control switch located adjacent to the sight switch.

MISCELLANEOUS EQUIPMENT.

GALLEY.

The galley is located on the left aft side of the cabin. Galley facilities include stowage cabinets with a work top and table, oven, refrigerator, liquid compartment, hot cups, fry pan, and percolator. A two-place, hinged seat (with stowage space beneath for loose equipment) is provided with two seat belts and can be used as a ditching station. The electrically powered refrigerator provides separate temperature zones for the simultaneous storage of prefrozen foods and prechilled food products. The oven and the 2-gallon liquid container are equipped with electrical connectors which plug in and are powered by switches located on the galley control panel. Two flush mounted outlets on the galley face are controlled by timing devices and are available for use with the hot cups. Three additional outlets are provided for the fry pan and percolator. Power-on lights, located on the galley control panel, glow when the hot cups, liquid container, and oven are in operation. The galley plug-in electrical connectors are powered by switches located on the galley control panel. Current is monitored automatically when either the empennage or propeller ice control systems are energized under a single-generator operation.

NEW

NEW

Note

The galley exhaust should remain open when cooking unless pressurization problems require that it be closed.

DINETTE.

Dinette facilities are located in the right aft position of the fuselage across the cabin aisle from the galley. A table and two benches with stowage cabinets beneath the seats are provided.

There are four seat-belt assemblies installed but only the forward outboard position is to be used for ditching.

LAVATORY.

Lavatory facilities are located in the aft cabin area and consist of a chemical toilet, a self-contained 6.5-gallon urinal, water tank, wash basin, razor outlet, mirror, light, and dispenser for paper towels and toilet paper are provided. The 4.5 US gallon water tank supplies wash water to the basin. Waste water is collected in a removable container below the basin. Red and white lights are provided for illuminating the lavatory compartment.

CAUTION

The lavatory in the P-3 aircraft was not designed to stow loose gear; therefore, loose gear stowed in that area shall be kept to a minimum to prevent damage to the lavatory.

BUNKS.

Two bunks are installed on the aft right side of the aircraft. The bunks are hinged to fold back so that the dinette and work bench area may be used when desired.

LADDER.

The aircraft is equipped with a track-mounted, stowable, electro-mechanically operated entry ladder equipped with collapsible handrails (for utility) and terrain compensating features for leveling of the ladder feet. An actuator with a chain drive mechanism deploys and retracts that ladder. Main ac bus A power is supplied to a dc controlled three-phase reversible type motor through a LADDER circuit breaker on the aft electronic circuit breaker panel. A ladder switch (UP, DOWN, OFF), located at the lighting console aft of the main cabin doorway, controls the motor. An interlock permits operation of the ladder only when the cabin door is open and stowed. Load limit switches, self-release plug disconnects, and a step illuminating light are incorporated as safety factors.

CAUTION

Damage to the drive, stops, or gear train will result if the actuator is overdriven during manual operation.

A hand crank is provided for manual operation if electrical power fails. The crank is stowed on the forward side of the actuator assembly by clips.

Note

Alignment of the manual drive index is necessary to lock the actuator and hold the ladder rigidly in flight.

The ladder has two positions on the floor tracks. It shall be outboard for deployment and inboard for in-flight stowage and cabin door operation. A foot latch allows the ladder to unlock and to be moved to an alternate position. Openings at the inboard end of each track permit the ladder to be removed from the tracks, if desired, for cargo loading. The ladder should be in the outboard position on the track for deployment prior to actuation of the ladder switch.

To remove the ladder from its tracks, rotate the stop to the unlocked (horizontal) position and release the foot latch.

CAUTION

Handrails must be in upright position with quick release pins installed prior to unfolding from the half-tuck or tuck-under position, or when raising or lowering the ladder.

MAP CASE.

The aircraft is equipped with three map cases; one is located in the aft platform of the pilot side console, one attached to the forward wall of electronics rack A1, and one attached to the flight station wall aft of the copilot side console.

APPROACH PLATE HOLDER.*

An approach plate holder, normally stowed in the pilot and copilot map cases, can be attached to each control wheel when required. The flight station utility lights can be attached to the light brackets above the side windshields to provide approach plate illumination.

MISCELLANEOUS STOWAGE LOCKER.

Two miscellaneous stowage lockers are located at the right aft fuselage area beneath the work surface aft of the dinette.

PUBLICATiONS STOWAGE BOX.

A publications stowage box is located at the right aft fuselage area above the work area just aft of the dinette.

*Aircraft BUNO 159889, 160290 and subsequent.

NAVIGATOR STEP.

A navigator step is provided for use when the sextant is to be utilized in the provided mount. Of aluminum construction, it is hinged to a slide assembly on the left side of the NAV/COMM station bulkhead. When not in use, it is stowed by folding against the bulkhead and secured. When extended, it is bracket-supported on the TACCO station bulkhead. In place, the step actuates a switch which turns on the aisle obstruction warning lights.

SECURITY LOCKER.

A security locker, located in the aisle bulkhead at the TACCO station has provisions for locking the locker.

WINDOW POLARIZED BLACKOUT FILTERS.

Two-piece polarized blackout filters are installed at the TACCO and NAV/COMM stations. The panels are retained by guides so that the entire panel can be pushed away from the window, allowing unrestricted use of the forward bubble-type windows for observation or illumination. If subdued light is desired, the panel containing the polarized filter can be moved into position to cover the window. The panel at the TACCO station slides forward for access to the window, the panel at the NAV/COMM station slides aft. The outer piece of the filter is installed in a fixed position but the inner piece can be rotated, using an attached knob, so that the filter can adjust to the degree of light passage. Filter rotation is limited to ninety degrees. Maximum darkness is achieved by rotating the inner polarized filter in a counterclockwise direction. A similar polarized filter is installed over the window at the sensor 3 station.

WARNING

Do not look directly at the sun through the polarizing type windows at the TACCO, NAV/COMM and sensor 3 stations, as central retinal injury to the eye may result due to thermal burns.

PILOTS SEATS.

The pilots seats are of tubular construction with nylon net covers. The nets are stretched across the frames, taut enough to support the pilots. The pilots seats are mounted on rollers which move forward and aft on rails set in the flight station floor. They are locked in the forward and aft position by pins attached to the seat structure. The pins are spring-loaded and are controlled by levers located under

the left front corners of the seats. The seats are also adjustable through a vertical travel of 5 inches. The seats are spring-loaded in the up position, which tends to raise the seat as the pilot weight is removed. The seat height is adjustable by control levers located under the right front corner of the seats. The seats have arm-rests which are adjustable in height and have a stowed position parallel to the seat back. The seat backs are adjustable, forward and aft, by recline control levers located under the left edges of the seats near the back. Removable headrests are provided on the seats which are also adjustable within a travel of 3 inches.

FLIGHT ENGINEER SEAT.

The flight engineer seat is of the same construction as the pilots seats. The major difference is that the tracks are skewed and the forward and aft lock mechanism inserts pins into holes in the top of the rails instead of through the vertical webs. This difference precludes the necessity for wide opening in the flight station floor. The flight engineer seat is located between the pilots seats in the center of the flight station.

NAV/COMM, TACCO, SENSOR 3 SEATS.

The NAV/COMM, TACCO, and sensor station 3 seat constuction is similar to that of the pilot and flight engineer seats. They are mounted on tracks and may be moved laterally or locked into position by use of a step-treadle mounted on each seat base. Forward and aft movement and adjustment is incorporated in a mechanism located between the seat bottom and the mounting pedestal. Each seat is equipped with a shoulder harness but not with an inertial reel.

CREW SEATS.

The observer and sensor station 1 and 2 crew seats are similar to the pilots seats. These seats can be moved along tracks or locked in position by use of a step-treadle mounted at each seat base. Forward and aft seat adjustment may be made by the recline-lever, located under the seats. These crew seats are designed to swivel through 360 degrees and may be locked in positions differing by 45 degrees. The seats have no provisions for shoulder harnesses since they can be faced aft for ditching.

SEAT BELTS.

Each seat is equipped with a safety belt. Thirteen extra belts are installed for additional ditching stations; belts are attached at designated crew ditching stations. (Refer to Section V, figure 5-6, Surface Emergency Evacuation and Crew Ditching Stations.) All personnel should fasten their seat belt while seated at a ditching station. NEW

SHOULDER HARNESS.

The pilot, copilot, flight engineer, TACCO, NAV/COMM, and sensor station 3 seats have shoulder harnesses. All other seats on the aircraft can be rotated to face aft and therefore do not require shoulder harnesses.

INERTIA REEL.

Each flight station seat incorporates an inertia reel. A control located on the left side of each seat permits the inertia reels to be locked or unlocked manually. When a forward inertia force of 2G to 3G is applied to the reel, it automatically locks and secures the harness.

HARD HATS.

Stowage for hard hats is provided at each primary crew position.

ALDIS LAMP.

Some aircraft are equipped with an Aldis lamp, which can be used during night flights for inspecting wings and engine nacelles (for example when oil or fuel leaks are suspected). Power receptacles for the lamp are located in the flight station and at the TACCO, NAV/COMM, ordnance, and flight technician stations.

ELECTRONIC RACK H1/H2 COOLING FANS.*

To increase the reliability of the ASN-84 and the APX-72, cooling fans were added to electronic rack H1/H2. These fans are powered by the monitorable essential ac bus through the ELECTRONIC BAY FAN POWER circuit breaker, located on the aft left electronic circuit breaker panel. This circuit breaker is a 5A, 3ϕ, 400 Hz ganged circuit breaker.

CAUTION

The ELECTRONIC BAY FAN POWER circuit breaker should not be pulled during preflight, plane-side brief, or flight for noise reason due to possible inertial or IFF failures/damage.

*Aircraft with AFC 335 installed.

EMERGENCY EQUIPMENT.

EMERGENCY ESCAPE ROPE.

An emergency escape rope is provided inside the cabin entrance above the cabin door.

SAR BAR.

The SAR bar is an expandable metal bar stowed on the underside of the port galley seat. It is designed to be inserted into the holes in the main cabin door opening that are filled by the locking bars on the door when it is closed. The SAR bar should be inserted into the middle set of holes to provide maximum safety. It may be inserted in flight with the door open or on the ground with either the ladder tucked under or raised inside the aircraft and the door open.

FIRE AXE.

A fire axe is attached at the aft end of the sonobuoy stowage rack on the right side of the aircraft. (See figure 5-4.) Two strap assemblies hold the axe in place. The blade of the axe should be used to make a horizontal cut in the insulation along the top boundary of the designated cutout area. (See figure 5-6.) After tearing away the insulation, the pick end of the axe should be used to make the initial puncture through the fuselage, starting in the upper left hand corner of the cutout area. The blade of the axe should then be used to chop through the top and two sides, forming an inverted U. The skin of the aircraft should then be kicked outward, resulting in an emergency exit free of a jagged edge along the bottom boundary.

PORTABLE FIRE EXTINGUISHERS.

Three 2.5 pound fire extinguishers are provided; each has a useful discharge time of 12 to 15 seconds. One extinguisher is located on the aisle panel at the NAV/COMM station. This extinguisher may be obstructed when the NAV/COMM step is down. A second extinguisher is stowed at the end of the sonobuoy stowage rack. The third extinguisher is fastened to the aft portion of electronics rack J2.

LIFERAFTS.

The P-3C is equipped with one 12-man raft (near starboard overwing hatch) and one 7-man raft (near port overwing hatch). A second 7-man raft is normally carried and will be stowed behind the 12-man raft (near starboard overwing hatch). Each raft has a survivial kit containing equipment with the raft as prescribed in NAVAIR 13-1-6.1.

Liferaft Contents.

	Quantities MK-7	MK-12
Flare gun MK-79 Mod 0	1	1
Signal light (strobe) SDU-5E	1	1
Signal light (steady burning) 761-A	1	1
Signal mirror (large or small)	1	1
*Survival radio (PRT-5) or beacon (URT-33)	1	1
Whistle	1	1
Compass (pocket or wrist)	1	1
Pocket knife	1	1
Nylon cord (50 feet)	1	1
Accessory Container:		
Dye marker	4	5
Distress signal MK-13 Mod 0	6	8
Water storage bag	3	4
Canned water (10-oz) with can opener	7	12
or desalter kit	4	6
First aid kit	1	1
Sunburn ointment	1	2
Rations	7	12
Bailing sponge	1	2
Hand pump	1	1
Space blanket	1	2
Flashlight (hand-generated)	1	1

*The MK-12 shall contain a PRT-5. At least one MK-7 should contain a PRT-5 so that two are on board.

LIFE VESTS.

Life vests will be stowed on the rack above the sonobuoy pressure chutes on the starboard side of aircraft. They shall be worn during takeoff and landing when the path of flight is over water and at all times over water by flight station personnel. Crewmembers and passengers shall wear a life vest at all times when below 1000 feet over water or when the PPC deems it necessary. Whenever conditions of flight do not require life vests to be worn, they should be stowed in a readily accessible place.

WARNING

Do not inflate the Mark II life vest or the LPP-1 life preserver while wearing a parachute or parachute harness.

Life Vests Mark II.

The life vest contains three separate air compartments in layer form. The inner and outer compartments can be

inflated by a CO_2 cartridge on lower left and right sides, respectively. The middle compartment can be inflated by an oral inflation tube located on the left upper side.

The knurled locknut on the oral inflation valve should be turned down fully for immediate oral inflation, if necessary.

There are two day/night signal flares (MK-13) available, one on each outboard side, which should be stowed day end up. The night end can be identified by a series of raised bumps or knobs or by a lanyard with a large metal ring attached.

There are two separate dye marker packets stowed in the right center pocket. They will appear as flourescent green when deployed and will last approximately 1 hour in a moderate sea.

The left center pocket contains a whistle which is attached to the oral inflation tube retainer. The whistle has a range of approximately 1000 yards.

A vest light is attached to the upper side of the life vest. On the yellow life vest, it should be transferred to the left side when in the water.

There is an 800-pound test helo-hoist strap over the right shoulder and a metal D-ring on lower right side of the waist webbing for securing of the liferaft lanyard.

LPA-1A FLOTATION ASSEMBLY.

The flotation assembly is constructed to form three lobes joined by tubes: the right waist lobe, the collar lobe, and the left waist lobe. Half of the right waist lobe and the collar lobe comprise one compartment. This compartment is serviced by the oral inflation valve and inflation assembly attached to the right waist lobe. The left waist lobe and the remaining half of the right waist lobe comprise the second compartment. It is serviced by the oral inflation valve and inflation assembly attached to the left waist lobe.

The casing assembly protects the flotation assembly and provides for attachment of the preserver assembly to the SV-2A survival vest. The belt-keepers, attached to the inboard side of the casing, are used to secure the casing to the wearer's SV-2A at the waist. A D-ring is attached to each belt-keeper. Flare and dye marker pouches, the liferaft retaining line and other accessories may be attached to these D-rings.

LPA-2 FLOTATION ASSEMBLY

The LPA-2 is designed as a constant wear item for use with the survival vest (SV-2A) and will not interfere with the removal of the nonintegrated parachute harness (parachute risers are routed outside the collar lobes). The LPA-2 life preserver assembly consists of a two-chambered flotation assembly, a casing assembly, two CO_2 inflation assemblies, and optional survival items and pouches. One chamber consists of the left waist lobe and right collar lobe. The right waist lobe and left collar lobe form a second chamber. Each chamber is equipped with a CO_2 inflation assembly and an oral inflation tube. The waist lobes are equipped with a snaphook and a D-ring to secure them together after inflation.

SV-2A/B SURVIVAL VEST.

The SV-2 series vest is constructed basically of nylon cloth. An adjustable harness, leg straps, and an entrance slide fastener provide a means of securing the vest to the aircrewman. Elastic straps at the rear allow greater comfort and mobility for the wearer. Pockets are provided for stowage of survival items. The vest should be fitted to the individual crewmember.

LPP-1 LIFE PRESERVER.

The LPP-1 life preserver consists of a single-compartment, yoke-type flotation assembly, a pouch and belt assembly, and an inflation assembly. Survival items provided are a whistle, one packet of dye-marker, and a steady-burning, seawater-activated distress light.

The pouch and belt assembly consists of a rubber coated nylon pouch and adjustable belt. The pouch contains the flotation assembly and the survival items. The belt consists of a 53-inch piece of webbing, an adjustable buckle and clasp, and a toggle assembly pocket. The belt adjusts for a waist size of 30 to 53 inches, and attaches to the flotation assembly and pouch by means of belt loops. The toggle assembly consists of a wooden toggle and line and is used to secure survivors together while in the water. When not in use, the toggle line is wrapped around the wooden toggle and stowed in the pocket located on the belt.

The inflation assembly consists of a carbon dioxide cartridge and an inflation valve. The inflation assembly is connected to the valve stem on the front side of the assembly. The valve stem is equipped with a removable check which prevents leakage.

When the LPP-1 is worn with a hard hat, the flotation assembly shall be removed from the pouch and the yoke placed over the head.

ANTI-EXPOSURE SUITS.

Anti-exposure suits shall be provided for all flight personnel and passengers flying aboard P-3C aircraft when, in the

event of a mishap, there would be a significant risk of water entry, and when atmospheric conditions described in OPNAVINST 3710.7 (series) exist. An anti-exposure suit will be stowed either at each ditching station or reasonably nearby.

PENCIL FLARE GUN.

WARNING

- The pencil flare projector should be loaded in the cocked position. Failure to follow this procedure will create a hazard to all persons in the area of loading.

- The MK-79 MOD 0 signal kit consists of one pencil flare projector and seven signal cartridges. It is normally stored on the left side of the SV-2A survival vest adjacent to the centerline zipper. When the SV-2A/B is worn by a crewmember, the pencil flare projector shall be stored in the cocked position.

PARACHUTE NB-8.

NEW

The NB-8 parachute is a backpack type parachute with a 28-foot flat canopy. The parachute and harness are integrated. The ripcord located on the left side of the harness is used to actuate the chute. When clear of the aircraft, a steady pull of 22 to 28 pounds releases the ripcord and deploys the chute. Once the canopy is deployed, the rate of descent is about 18 feet per second.

The P-3C normally has 23 parachutes aboard that are stowed as indicated in figure 5-7.

FLIGHT STATION OVERHEAD EMERGENCY EXIT HATCH.

The flight station escape hatch is located on the top centerline of the flight station, just aft of the flight engineer seat (see figures 1-2 and 5-2). This hatch is approximately 22 inches wide and 27 inches long. It is hinged on the left side and opens inward; it is equipped with a spring-loaded, hold-open mechanism. The hatch is removed by withdrawing one of the hinge pins. The hatch is designed for normal internal latch opening, but can be opened in an emergency by operating a pushplate on the exterior surface. A small hinged smoke vent is installed in the hatch.

FLIGHT STATION AUXILIARY EMERGENCY EXIT.

The flight station auxiliary exit is located just aft of the left aft windshield panel. (See figures 1-2 and 5-2). It is approximately 21 inches wide and 23 inches high; the hatch is hinged at the aft edge and opens inward. A latch is provided that may be opened normally from the inside and in an emergency, from the outside. When the hatch is open it can be removed easily by lifting it off the hinge brackets.

EMERGENCY EXIT LIGHTS.

The aircraft is equipped with four emergency exit lights which incorporate two dry cell batteries to furnish power for the lights. One light is located at each of the overwing emergency exits, the main cabin door, and near the flight station overhead emergency exit. The emergency light has a two-position ON-OFF switch with provisions for manual and automatic operation. In the ON position, the light remains illuminated. When placed in the OFF position, an inertia switch located behind the light in the mounting rack closes the circuit and causes the light to illuminate whenever a force of 1.5G is applied. These lights shall be used for emergencies only.

FIRST AID KITS.

Two first aid kits are installed in the aircraft. One is located on the outside of the aft bulkhead of the main load center at the starboard overwing emergency exit and the other is attached on the forward bulkhead of the electronics rack at the port overwing emergency exit. In addition to these kits, there is an additional first aid kit in each liferaft. The following equipment will be found in the first aid kits:

CONTENTS OF THE P-3 FIRST AID KIT:

Battle dressings (2)
Razor blade (1)
Ammonia inhalant (1)
Gauze 4 x 4 (1)
Dressing 4 x 7 (1)
Petrolatum gauze (1)
Tourniquet (1)
M-2 eye dressing (1)
Benzalkonium (10cc) (Mercurochrome)
Bandaids (1 pk)
Water purification tablets (50)

EMERGENCY RADIO FLOAT ASSEMBLY

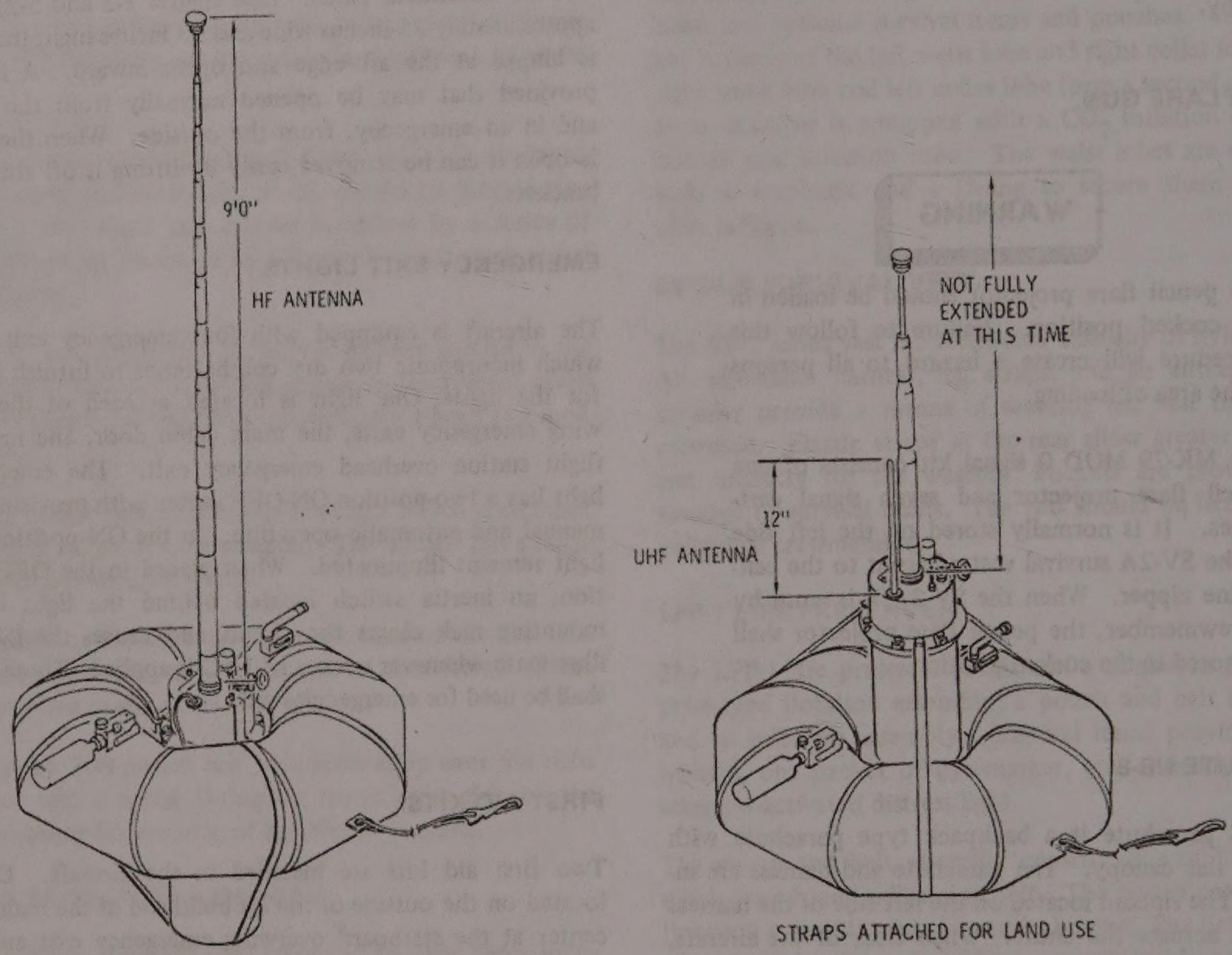


Figure 1-43. Emergency Radio Float Assembly

EMERGENCY WATER BREAKER.

The aircraft is equipped with two emergency portable water breakers, one installed at each overwing emergency escape hatch. The capacity of each breaker is 2.5 U.S. gallons.

EMERGENCY RADIOS.

A PRT-5 or URT-33 (PRC-49, PRC-63, or equivalent) emergency transmitter is installed in the survival kit of each liferaft package. The transmitting set, AN/PRT-5, is a battery-operated, emergency radio which transmits on emergency guard frequencies of 8.364 MHz (8364 kHz) and 243.0 MHz simultaneously. An inflatable float assembly (see figure 1-43) is included to allow the set to float at sea, and provides a support platform for use on land. The entire set is packed in a cloth pocket and stowed in the liferaft. The battery pack is designed to provide rated power for at least 72 hours at 25°C (77°F). The transmitting set will continue to transmit at reduced power until the battery discharges completely or about 20 percent longer than the hours listed.

Characteristics of the PRT-5.

1. Range: UHF – 160 nautical miles with search aircraft at 30,000 feet using military ADF receiver.

   HF – Varies with time of day and propagation characteristics of area.

2. Operating temperature: (-40°F to +131°F).

3. Altitude: Sea-level to 40,000 feet.

4. Net weight: 15 pounds.

5. Antenna height: UHF–12 inches.
HF–9 feet.

6. Size (packed): 6 inches in diameter by 16 inches long.

The PRT-5 is constructed in a water-tight, two-part aluminum case. The top part is the electronic housing assembly. The lower part is the battery case. The float assembly can be inflated either orally or by CO_2 cartridge. Straps sewn to the float assembly permit adjustment for use on land or sea.

The radio beacon set URT-33 (PRC-49, PRC-63, or equivalent) is a hand-held emergency radio that transmits a distress signal on 243 MHz. The URT-33 will transmit continuously for 15 hours. The operating instructions are contained on the cover.

Note

For operation procedure and description of radio outputs, refer to Section V.

PRC-90 Dual-Channel Survival Radio.

1. Operational Features

a. Voice transmit and receive

b. beacon transmit

c. morse code transmit

2. Function Selector

a. Voice/MCW 243.0 MHz

(1) Permits transmit and receive on emergency frequency (243.0 MHz)

(2) Permits morse code transmit and receive

b. Voice 282.8 MHz

(1) Permits voice transmission only

(2) Morse code or beacon unavailable

c. BCN 243.0 MHz

(1) Automatically transmits a continuous swept-like tone beacon signal

(2) Morse code or voice unavailable

3. Volume Control – Controls received beacon tone and voice volume.

4. Push-To-Talk Button – Used to transmit voice on on 243.0 or 282.8 MHz

5. Morse Code Key

a. Located on top of radio set

b. Used to transmit morse code on 243.0 MHz

6. Antennas

a. 1/2 wave, five section telescopic

b. 1/4 wave flex, snaps into position

Note

Individual radios may be equipped with either 1/2 or 1/4 wave antennas.

CRASH LOCATOR SYSTEM.

The URT-26(V) crash locator system is a deployable crash-position indicator (CPI) system utilizing an airfoil package containing a 243.0-MHz transmitter (radio beacon), an antenna, and a rechargeable battery pack. The radio beacon aids air-sea-land search operations. The airfoil package is an aerodynamically designed plastic foam fiberglass-encased envelope that withstands high-impact shock on release and landing and floats on water indefinitely. Sensors automatically initiate deployment of the airfoil package from the aircraft. The airfoil package then carries its payload in a predetermined, speed-reducing trajectory to the earth surface outside the periphery of the aircraft impact area. The radio beacon begins operation automatically, when the airfoil package is deployed, and emits an emergency distress signal which can be received at a distance of 80 miles by search aircraft flying at an altitude of 10,000 feet.

Note

On aircraft 161007 and subsequent and aircraft incorporating AFC 374, if the crash locator becomes a screamer, it can be silenced by plugging the muting battery into the galley overhead storage bag.

SSQ-83 EMERGENCY SONOBUOY.

The SSQ-83 Emergency (SAR) Sonobuoy is designed to assist in the marking and location of aircraft survivors at sea, and cannot be used for ASW purposes. A floating microphone is provided for one-way communication. The RF beacon radiates automatically and continuously, regardless of whether the microphone is used or not. A blinking night light and 1-hour dye marker are incoporated in the buoy as well as an 8-foot tether line for attaching the buoy to a liferaft or person. Refer to Section V for operating procedures.

Characteristics of the AN/SSQ-83.

Frequency:	Channel 15 (172.75 MHz)
Operating Life:	60 Hours
Hydrophone:	Single element, floating microphone attached to a 20-foot cord.

INTERCOMMUNICATION SYSTEM.

An intercommunication system, AIC-22, is installed to provide intercommunication facilities for crewmembers. A pilot, copilot, and TACCO operated public address (PA) system, and radio receiving facilities are provided for each station. In addition, transmitting facilities are provided in the pilot, copilot, TACCO, and NAV/COMM stations. Audio monitor circuits are provided for special-purpose equipment. (See figure FO-5) for a block diagram of the intercom system. Twelve headsets are provided, one for each crew station and the ordnance station and nosewheel well. A microphone control switch is installed on the pilot and copilot control wheel, and a knee-operated ICS-disconnect switch is mounted on each side of the pilot center control stand. Five foot-controlled microphone switches are located one each in the TACCO and NAV/COMM stations, and in sensor stations 1, 2, and 3. A microphone switch for the flight engineer is located on the center control stand in the flight station. Twelve boom dynamic microphones are provided, located one in each of the ten crew stations, plus one each in the ordnance station, and the nosewheel well. Also, 12 handheld dynamic microphones are located one each in the crew stations, the galley station, and the ordnance station. Two 15-foot headset connecting cord assemblies, with microphone switches attached, are located in the F1 rack and in the nosewheel well. Six-foot connecting cord assemblies with microphone switches are provided in the pilot, copilot, flight engineer, TACCO, NAV/COMM, sensor stations 1, 2, 3, right observer and left observer stations. A 75-foot connecting cord assembly, with microphone switch attached, is stowed in the nosewheel well headset storage container and is provided for special use.

For use during the wearing of a smoke mask by the engineer, an ICS smoke mask microphone control switch is located in the flight engineer station. Smoke mask microphone switches for the pilot and copilot are located on side panels of the flight station. (A microphone is part of the smoke mask provided for use of the pilot, copilot, and flight engineer.) A radio record control is located on the pilot side console.

There are 12 interphone control stations (ICS) in the aircraft, one in the area of each crew station, and one in the galley area. The nosewheel well and tail boom areas incoporate interphone jack boxes for use on the ground. The pilot, copilot, TACCO, NAV/COMM stations have the necessary system components and controls required to communicate with other ICS, monitor special-purpose audio signals, and to transmit and receive voice communications with associated aircraft radio equipment in the secure or plain mode. Seven crew stations (flight engineer, sensor 1, 2, and 3, left oberver, right observer and ordnance) and the galley have the necessary components and controls required to communicate with other ICS, monitor plain voice communications on associated aircraft radio sets and to monitor selected special-purpose audio signals. The nosewheel well and tail boom ICS have facilities for communicating, on the ALL ICS line, with the other ICS. The tail boom station does not have a microphone or headset, although facilities for connecting them are available. Intercommunication functions at the pilot and copilot stations consist of an ALL ICS line, two conference group lines, a public address (PA) system, a disconnect function, an override function, an alternate function, and a selection for loudspeaker operation.

The TACCO and NAV/COMM stations have functions similar to the pilot and copilot stations, with the following exceptions: PA or override functions are not available at the NAV/COMM station.

The flight engineer; sensor stations 1, 2, and 3; left and right observer; ordnance; and galley stations are provided with intercommunication facilities consisting of an ALL ICS line, two conference group lines, and with exception of the flight engineer, right observer station, and left observer station, selection for loudspeaker operation. Sensor stations 1 an 2 also have a disconnect function.

Special-purpose receivers available for monitoring with the intercom consist of the automatic direction finder group,

the dual VOR navigation group, the tacan navigation set, a marker beacon receiver, and a sonobuoy radio receiver set. Sensor station 3 has additional selections for monitoring audio signals from the submarine anomaly detector and the ESM processor. Sensor stations 1 and 2 are provided with a selection feature to monitor an audio signal being recorded or reproduced on the AQH-4 tape recorder/reproducer.

Receiver and transmitter functions of UHF-1, UHF-2, HF-1, and HF-2 radio sets in the secure or plain voice modes, and VHF radio (always plain voice) are available to pilot, copilot, TACCO, and NAV/COMM stations. All other stations may receive (if selected) UHF, VHF, and HF audio signals in the plain voice mode only.

ICS Master Control Panel.

An ICS master control panel (figure 1-44) is installed at the pilot, copilot, TACCO, and NAV/COMM stations. Each control panel contains 24 lighted pushbutton-indicators and two volume control knobs. Positive 28 Vdc from the essential dc bus No. 2 on the forward load center circuit breaker panel is supplied to the unit through an internal 1.5-ampere fuse and direct current filter network. The master control boxes are internally identical and differ only in the connected lines and front plastic panel. Figure 1-44 identifies the ICS master control panel switches and their functions.

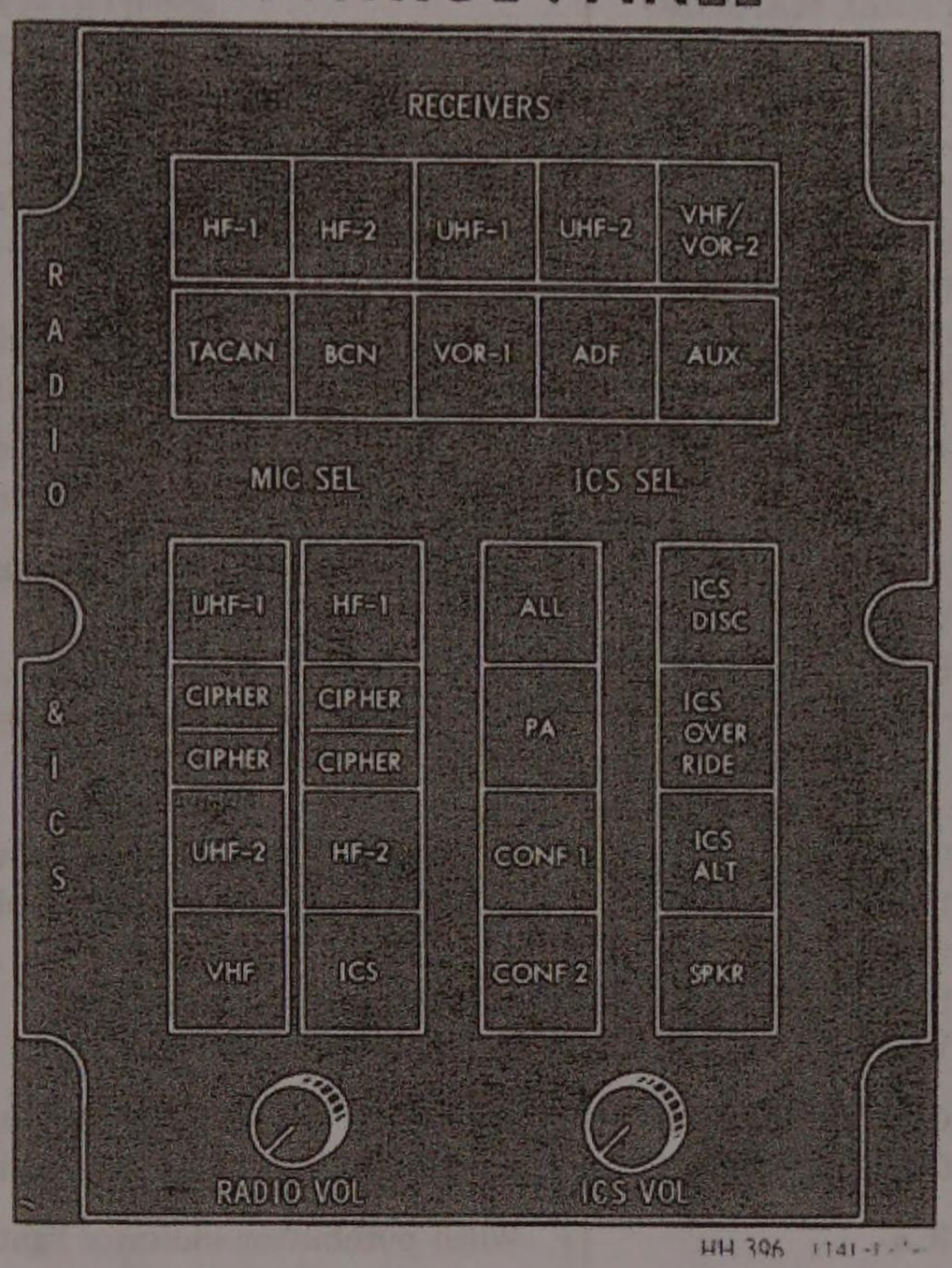


Figure 1-44. ICS Master Control Panel (Sheet 1 of 7)

ICS Crew Control Panel.

An ICS crew control panel (figure 1-45) is installed at the flight engineer station, sensor station 1, sensor station 2, sensor station 3, left observer, right observer, ordnance, and galley stations. Each crew control panel contains four toggle switches, one selector control switch, and one volume control knob. Figure 1-45 lists detailed information pertaining to the identification and function of each panel control. Positive 28 Vdc from the essential dc bus No. 2 on the forward load center circuit breaker panel is supplied to the unit through an internal 0.25-ampere fuse. The ICS crew control panels are identical and differ only in the connected lines and front panel markings of the RECEIVER selection switch.

Ten loudspeaker assemblies are mounted throughout the aircraft at optimum locations to enable crewmembers to receive ICS or PA audio in their crew station area without the use of headsets. The units consist of a loudspeaker, amplifier, and an adjustable volume circuit.

Pilot Radio Record Control.

The pilot radio record control (figure 1-46), installed at the pilot side console, enables the pilot to select radio receiver and transmitter and normal ICS audio for recording on the sonobuoy tape recorder. The unit control panel contains an indicator light and a double-pole, double-throw toggle switch.

Note

If pilot has selected the record function, only pilot headset audio will be recorded. If the pilot should also select ICS disconnect, no ICS will be recorded. Pilot secure radio headset audio will not be recorded utilizing this function.

Hand-Held Microphone.

The hand-held microphone is a dynamic microphone with a built-in transistor preamplifier and a push-to-talk switch.

ICS MASTER CONTROL PANEL

PANEL MARKING	EQUIPMENT FUNCTION
RECEIVERS	
HF-1 HF-2 UHF-1 UHF-2 VHF/VOR-2	Respective radio receiver audio output connected to operator headset when pushbutton-indicator lighted amber
AUX	AUX line audio connected to operator headset when pushbutton-indicator lighted amber. Indicator is unlighted at all other times; the green lighting feature is not used
ADF VOR-1 BCN	Respective radio receiver audio output connected to operator headset when pushbutton-indicator lighted amber
MIC SEL	
UHF-1 HF-1 UHF-2 HF-2 VHF	Transmit-receive control and automatic monitoring of respective receiver audio output when pushbutton-indicator lighted amber
CIPHER/CIPHER CIPHER/CIPHER	Bottom or top half of indicator lighted amber to indicate adjacent upper or lower amber-lighted pushbutton-indicator function as selected in cipher mode
ICS	When pushbutton-indicator lighted amber, operator microphone connected to ICS audio line selected by ICS SEL pushbuttons
ICS SEL	
ALL	ICS connected to all other ICS when pushbutton-indicator lighted amber
ICS DISC	Incoming ICS audio disconnected and transferred to predetermine alternate when push-button-indicator lighted amber
PA	(Operable in pilot, copilot and TACCO stations only.) Headset and microphone connected to public-address circuit when pushbutton-indicator lighted amber
ICS OVERRIDE	Disconnect function of other ICS is over-ridden when pushbutton-indicator is lighted amber
CONF-1	Operator headset and microphone connected to conference 1 line when pushbutton-indicator lighted amber
ICS ALT	ICS audio paralleled with a predetermined ICS master control panel when pushbutton-indicator lighted amber
CONF-2	Operator headset and microphone connected to conference 2 line when pushbutton-indicator lighted amber
SPKR	All selected audio connected to loudspeaker when pushbutton-indicator lighted amber
RADIO VOL	Incoming radio receiver audio level and cipher voice level controlled by setting of control
ICS VOL	Incoming intercom audio level controlled by setting of control

Figure 1-44. ICS Master Control Panel (Sheet 2 of 7)

ICS MASTER CONTROL PANEL (Cont)

SELECTOR	CONDITIONS			
	DARK (not available for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
UHF-1 (MIC-SELECT)	UHF-1 PLAIN VOICE or CIPHER VOICE not selected at UHF-1 voice selector panel	If UHF-1 PLAIN VOICE or CIPHER VOICE are selected at UHF-1 voice selector panel and If UHF-2, HF-1, HF-2, VHF of ICS MIC-SEL is selected. If UHF-1 CIPHER STATUS goes from amber to dark (temporary reset)	When pressed if green before pressing	Connects operator headset and MIC switch to ICS UHF-1 audio and keyline. (Receive and transmit audio)
UHF-1 CIPHER (STATUS LIGHT)	UHF-1 CIPHER VOICE not selected at UHF-1 voice selector panel		UHF-1 CIPHER VOICE selected at UHF-1 voice selector panel	
UHF-2 CIPHER (STATUS LIGHT)	UHF-1 CIPHER VOICE not selected at comm selector panel		UHF-2 CIPHER VOICE selected at comm selector panel	
UHF-2 (MIC-SELECT)	UHF-2 PLAIN VOICE or CIPHER VOICE not selected at comm selector panel	If UHF-2 PLAIN VOICE or CIPHER VOICE is selected on comm selector panel and If UHF-1, HF-1, HF-2, VHF or ICS MIC-SEL is selected. If UHF-2 CIPHER station goes from amber to dark (temporary reset)	When pressed if green before pressing	Connects operator headset and MIC switch button to ICS UHF-2 audio and keyline. (Receive and transmit audio)
VHF (MIC-SELECT)	VOR-2/VHF Power off, not in T/R mode, or frequency is below 116 MHz	If UHF-1, UHF-2, HF-1, HF-2 or ICS MIC-SEL is selected	When pressed if green before pressing	Connects operator headset and MIC switch to ICS VHF audio and keyline. (Receive and transmit audio)

Figure 1-44. ICS Master Control Panel (Sheet 3 of 7)

ICS MASTER CONTROL PANEL (Cont)

SELECTOR	CONDITIONS			
	DARK (not available for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
HF-1 (MIC-SELECT)	HF-1 PLAIN VOICE or CIPHER VOICE not selected at comm selector panel		When pressed if green before pressing or If both HF-1 and HF-2 cipher status lights are illuminated and HF-2 MIC-SEL is selected	Connects operator headset and MIC switch to ICS HF-1 audio and keyline. (Receive and transmit audio)
HF-1 CIPHER (STATUS LIGHT)	HF-1 CIPHER VOICE not selected on comm selector panel HF-2 CIPHER VOICE not selected on comm selector panel		HF-1 CIPHER VOICE selected on comm selector panel HF-2 CIPHER VOICE selected on comm selector panel	
HF-2 (MIC-SELECT)	HF-2 PLAIN VOICE or CIPHER VOICE not selected at comm selector panel		When pressed if green before pressing or If both HF-1 and HF-2 cipher status are lighted and HF-1 MIC-SEL selected	Connects operator headset and MIC switch to ICS HF-2 audio and keyline. (Receive and transmit audio)
ICS (MIC-SELECT)			When pressed if green before pressing	Connects operator headset and MIC switch to ICS audio and keyline as selected on ICS HF-2 and HF-2 SEL switches
HF-1 (RECEIVERS)	HF-1 radio set power off or HF-1 CIPHER status light lit amber and HF-1 MIC SEL not selected or UHF-1 or 2, or HF-2 CIPHER MIC SEL selection made	Not dark and not selected	When pressed if green before pressing or HF-1 MIC-SEL is amber	Connects HF-1 Rec audio to operator headset

Figure 1-44. ICS Master Control Panel (Sheet 4 of 7)

ICS MASTER CONTROL PANEL (Cont)

SELECTOR	CONDITIONS			
	DARK (not available for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
HF-2 (RECEIVERS)	(Same as above except substitute HF-2 for HF-1 and HF-1 for HF-2)	Not dark and not selected	When pressed if green before pressing or HF-2 MIC-SEL is amber	Connects HF-2 Rec audio to operator headset
UHF-1 (RECEIVERS)	UHF-1 radio set power off or UHF-1 CIPHER status light lit amber and UHF-1 MIC SEL not selected or UHF-2 or HF-1 or 2 CIPHER MIC SEL selection made	Not dark and not selected	When pressed if green before pressing or UHF-1 MIC SEL is amber	Connects UHF-1 Rec audio to operator headset
UHF-2 (RECEIVERS)	UHF-2 radio set power off or UHF-2 CIPHER status light lit amber and UHF-2 MIC SEL not selected or UHF-1 or HF-1 or 2 CIPHER MIC SEL selection made	Not dark and not selected	When pressed if green before pressing or UHF-2 MIC SEL is amber	Connects UHF-2 rec audio to operator headset
VHF TACAN BCN (RECEIVERS) VOR-1 ADF	Appropriate system power is off or UHF-1 or 2, or HF-1 or 2 CIPHER VOICE selection on MIC select switches	Power on to appropriate system	When pressed if green before pressing	Connects appropriate rec audio to operator headset
AUX	UHF-1 or 2, HF-1 or 2 CIPHER VOICE selected on MIC select switches	No green indication used	When pressed	Connects AUX audio to operator headset

Figure 1-44. ICS Master Control Panel (Sheet 5 of 7)

ICS MASTER CONTROL PANEL (Cont)

SELECTOR	CONDITIONS			
	DARK (not available) for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
ALL (ICS-SEL) (Same for all stations)	UHF-1 or 2, or HF-1 or 2 CIPHER VOICE is selected on MIC select switches	If PA, CONF 1, or CONF 2 is selected on ICS SEL switches	When pressed if green before pressing	Connects headset and MIC to ALL ICS
PA (ICS-SEL) (PILOT/ COPILOT, TACCO)	UHF-1 or 2, or HF-1 or 2 CIPHER VOICE is selected on MIC select switches **Note** PA will always be dark at NAV/COMM station.	If ALL, CONF 1; or CONF 2 is selected on ICS SEL switches	When pressed if green before pressing	Connects headset and MIC to PA ICS audio net
CONF-1 ICS-SEL (Same all stations)	UHF-1 or 2, or HF-1 or 2 CIPHER VOICE is selected on MIC select switches	If ALL, PA, or CONF 2, selected on ICS SEL switches	When pressed if green before pressing	Connects headset and MIC to CONF 1 ICS audio net
CONF-2 ICS-SEL (Same all stations)	(Same as CONF 1)	If ALL, PA, or CONF 1 is selected on ICS SEL switches	When pressed if green before pressing	Connects headset and MIC to CONF 2 ICS audio net
ICS DISC.	(Same as CONF 1) plus Copilot ICS DISC is dark when pilot has disconnected TACCO ICS DISC is dark when NAV/ COMM has disconnected	Not selected	When pressed if green before pressing	PILOT–transfers ICS audio to copilot COPILOT–transfers ICS audio to pilot TACCO–transfers ICS audio to NAV/ COMM NAV/COMM–transfers ICS audio to TACCO

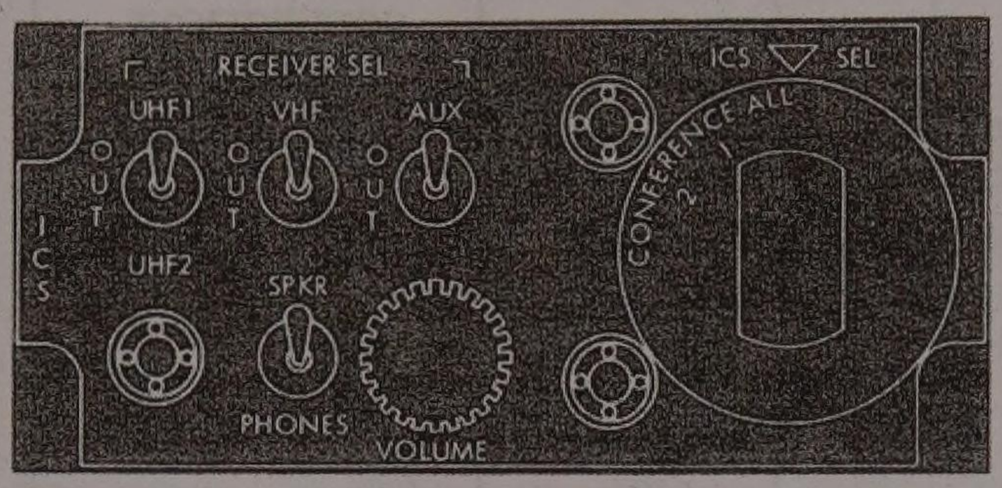
Figure 1-44. ICS Master Control Panel (Sheet 6 of 7)

ICS MASTER CONTROL PANEL (Cont)

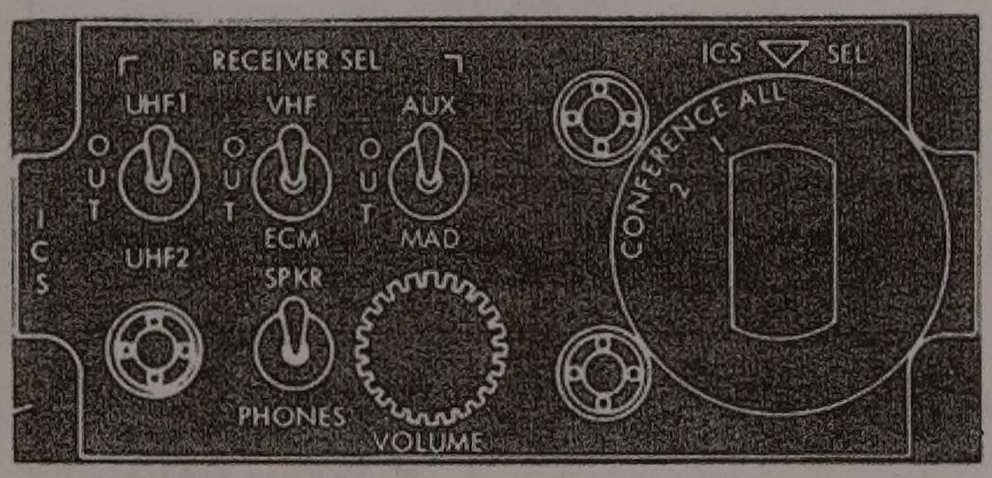
SELECTOR	CONDITIONS			
	DARK (not available for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
ICS OVERRIDE (Momentary action)	(Same as CONF 1) plus NAV/COMM–always dark TACCO–if NAV/ COMM and SS-1 and SS-2 not disconnected PILOT–if TACCO, NAV/COMM, and copilot not disconnected COPILOT–if TACCO, NAV/COMM, and pilot not disconnected	TACCO–if NAV/ COMM or sensor station 1 or 2 is disconnected PILOT–if TACCO, NAV/COMM, copilot, or sensor station 1 or 2 is disconnected COPILOT–if TACCO NAV/COMM, pilot, or sensor station 1 or 2 is disconnected	When pressed if green before pressing	Reconnects headset to audio net
ICS ALT	(Same as CONF 1)	Not selected	When pressed if green before pressing	Connects operator headset to ICS audio selected at alternate station Pilot to copilot and vice versa TACCO to NAV/ COMM and vice versa
SPKR	(Same as CONF 1)	Not selected	When pressed if green before pressing	Connects all selected audio to loudspeaker

Figure 1-44. ICS Master Control Panel (Sheet 7 of 7)

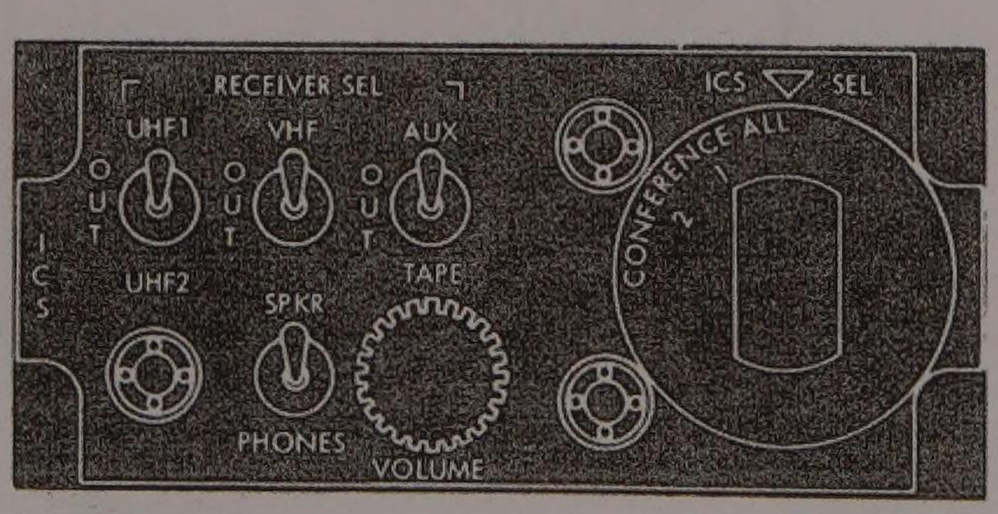
ICS CREW STATION CONTROL PANEL



FLIGHT ENGINEER STA, L&R OBSERVER STA, GALLEY



SENSOR STA 3



SENSOR STA 1&2

PAC-1(C5)0252

PANEL MARKING	EQUIPMENT FUNCTION
RECEIVER SEL	
UHF 1	UHF 1 receiver audio selected for monitoring
OUT	
UHF 2	UHF 2 receiver audio selected for monitoring
VHF	VHF receiver audio selected for monitoring
OUT	
ECM	(Sensor station 3 only.) ESM direction finder receiver audio/ alarm selected for monitoring
AUX	Auxiliary line audio selected for monitoring
OUT	
TAPE	(Sensor stations 1 and 2 only.) AQH-4 recorder/reproducer audio selected for monitoring
MAD	(Sensor station 3 only.) MAD audio output selected for monitoring
ICS SEL	
CONFERENCE 1	ICS connected to conference line 1 audio
CONFERENCE 2	ICS connected to conference line 2 audio
ALL	ICS connected to all other ICS, including nosewheel well and tail boom when aircraft is on the ground
VOLUME	Audio input level to ICS controlled according to degree of rotation (maximum level, CW)
PHONES	Incoming audio connected to headset
SPKR	Incoming audio connected to loudspeaker in station area in addition to headset

Figure 1-45. ICS Crew Control Panel

RADIO RECORD CONTROL PANEL

F141-PT1-7-42

PANEL MARKING	EQUIPMENT FUNCTION
RECORD-OFF toggle switch	
RECORD	Connects radio transmitter and receiver audio to SONO tape recorder. Only receivers and transmitters selected at pilot ICS master control panel will be recorded
OFF	Connects normal intercom audio (ALL) to sono tape recorder
RECORDING light	Illuminates green to indicate radio receiver and transmitter audio connected to sono tape recorder
AVAILABLE light	Illuminates green to indicate normal intercom audio connected to sono tape recorder and tape recorder available for connection to radio receiver and transmitter audio

Figure 1-46. Radio Record Control Panel

The attached cord is a preformed coil wire that permits easy storage when not in use. The connector is plugged into the amplifier interconnecting box, or into the amplifier interconnecting box, secure-unsecure. The output of the hand-held mike is high-level audio.

Controlwheel Microphone Switch.

Controlwheel switches, located outboard on the pilot and copilot control wheels, are three-position tab switches, labeled ICS forward, XMTR aft, and spring-loaded to the center (off) position. The switches are push-to-talk for radio transmission or interphone.

Flight Crew Smoke Mask Microphone.

A dynamic microphone and an audio frequency amplifier are built into the 651-01B smoke mask, used by the flight crew in case of smoke or fumes hazard in the flight station. Smoke masks are installed as loose equipment in the storage areas at the pilot, copilot, and flight engineer stations. The microphone in the mask is energized by operating the external push-to-talk.

Pilot, Copilot Smoke Mask Microphone Switch. Two intercommunication smoke mask microphone control switches (figure 1-47), labeled ICS MIKE, are provided on the forward part of the pilot side console for the pilot smoke mask microphone, and on the forward part of the copilot side console for the copilot smoke mask microphone. With the mike smoke mask-normal switch in the SMOKE MASK position, the smoke mask is connected to the intercom system. With the switch in the NORMAL position, the smoke mask microphone is not connected.

Flight Engineer Smoke Mask Microphone Switch. The flight engineer smoke mask ICS control panel (figure 1-48), located on the console below the flight station forward load center, is provided for the flight engineer to operate his microphone and headset when wearing a smoke mask. The panel contains a two-position toggle switch and a push-button, labeled MIKE. When the toggle switch is in the NORMAL position, the flight engineer communicates on the intercom normally, using his boom microphone or hand-held microphone for speaking. When the switch is in the SMOKE MASK position, the microphone in the smoke mask is connected to the intercom circuit and the flight engineer must depress the MIKE pushbutton on the panel each time he wishes to speak.

LOUDSPEAKERS

One speaker is installed at the pilot, copilot, TACCO, NAV/COMM, sensor station 3, one speaker between sensor stations 1 and 2, three speakers in the ordnance area, and one speaker in the galley area. Each speaker assembly consists of an isolation amplifier, muting circuitry, an output level control, a public address level control, a muting level control and the associated speaker. Access to the three adjustments is gained by removing the small cover on the face of the assembly.

Note

Three potentiometers are used to control volume level in each loudspeaker. They are adjusted by maintenance personnel and should not be changed by the flight crew except when absolutely necessary. The output level control is used to adjust for normal speaker volume with the SPEAKER pushbutton switch amber at pilot, copilot, TACCO and NAV/COMM

PILOT AND COPILOT ICS SMOKE MASK CONTROL

Figure 1-47. Pilot and Copilot ICS Smoke Mask Control

stations and the SPEAKER-PHONES switch at other stations in the SPEAKER position. Public address level control is used to adjust for normal speaker volume when using the speakers as a public address system. Muted level control is used to adjust for proper attenuation of speaker volume when the microphone is keyed at that station. Adjustments are made for use of a dynamic microphone; use of a carbon microphone will necessitate readjustment.

OPERATION.

The intercommunication system is energized whenever power is applied to the aircraft. Operation of the various functions of the intercommunication system at stations equipped with master control boxes (pilot, copilot, TACCO, and NAV/COMM) is initiated by operating lighted pushbutton-indicators on the respective master control panel. (A lighted pushbutton-indicator is available for selection when it is illuminated green. Selection has been made when it is illuminated amber. When a pushbutton-indicator is not lighted, it is not available for selection.) To operate proceed as follows:

At stations with ICS master control panels:

(See figure 1-44 for a listing of ICS master control panel select functions in radio transmit and receive modes, and in the ICS transmit-receive mode.)

FLIGHT ENGINEER ICS SMOKE MASK CONTROL PANEL

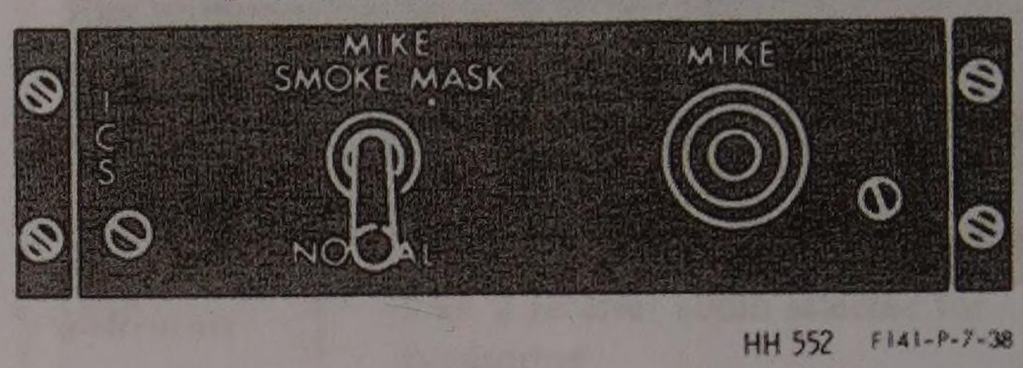


Figure 1-48. Flight Engineer ICS Smoke Mask Control Panel

1. MIC SEL ICS lighted pushbutton-indicator at station initiating call—Press. Pushbutton-indicator must light green before pressing. When pushbutton-indicator lights amber, continue with next step.

2. ICS SEL lighted pushbutton-indicator for ALL, PA, CONF 1, or CONF 1—Press. When selected pushbutton-indicator lights amber, continue with next step.

3. Monitor selected ICS line, prior to initiating call, to prevent interrupting calls on the line.

4. Press microphone push-to-talk switch and speak. Release push-to-talk switch.

Note

ICS SEL pushbutton-indicators are not available for selection (green) when UHF-1 or UHF-2, HF-1 or HF-2 CIPHER VOICE is selected on MIC SEL pushbutton-indicators.

5. For radio transmission, press appropriate MIC SEL green-lighted pushbutton-indicator. Selected pushbutton-indicator and associated RECEIVER indicator light amber.

6. Monitor selected radio channel prior to transmitting, to prevent interference with other stations.

7. Press microphone push-to-talk switch and speak; release switch.

8. For receiver monitoring, press desired RECEIVERS green-lighted pushbutton-indicator until it changes to amber.

9. Adjust radio volume control for desired audio level signal for headphones.

ICS INTERCONNECTION BOX C-4164/AIC-22

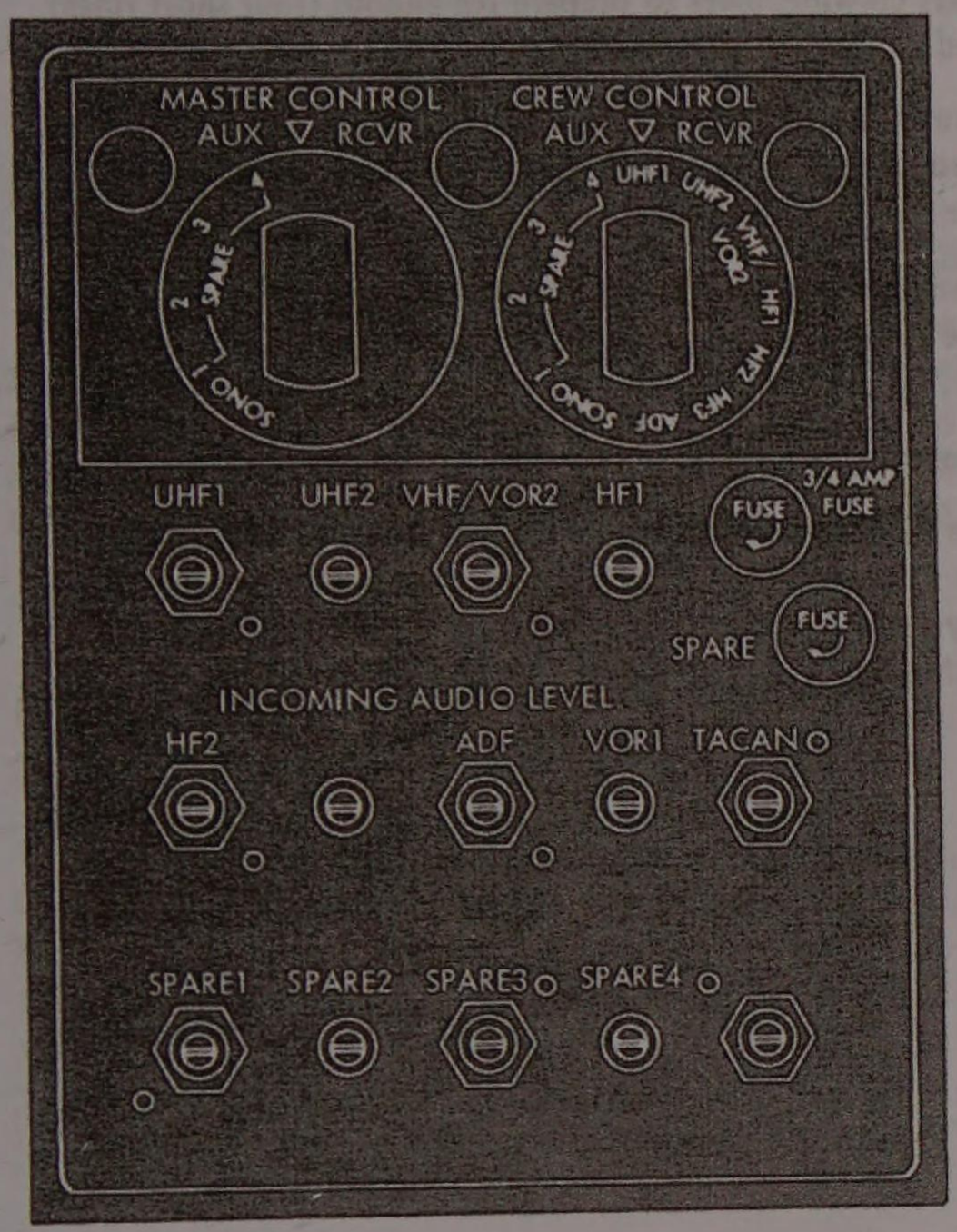


Figure 1-49. ICS Interconnection Box C-4164/AIC-22

Note

- RECEIVERS AUX lighted pushbutton-indicator is always unlighted until selected. MASTER CONTROL AUX RCVR selector switch on ICS interconnection box (figure 1-49) must be in desired position to receive auxiliary receiver audio.
- RECEIVERS lighted pushbutton-indicators are not available for selection when UHF-1 or UHF-2 or HF-1 or HF-2 CIPHER is selected on MIC SEL lighted pushbutton-indicators, except for the associated receiver.

At stations with ICS crew control panels:

1. ICS SEL selector switch at station initiating call set to desired line (ALL, CONFERENCE 1 or 2).

2. Monitor selected ICS line prior to initiating call to prevent interrupting calls on the line.

3. Press microphone push-to-talk switch and speak; release switch.

4. For receiver monitoring, place RECEIVER SEL switch of desired receiver to the indicated position.

Note

CREW CONTROL AUX RCVR selector switch on ICS interconnection box must be set to appropriate position to receive desired auxiliary receiver audio.

5. Adjust volume control for desired audio signal level in headset.

Emergency Turn-Off Procedures.

Electrical power to the intercommunication system is supplied through the closed COMMUNICATION INTERPHONE DC circuit breaker on the forward electronic circuit breaker panel. Normal and emergency deenergizing of the intercom consists of opening this circuit breaker. No other controls are required to deenergize the system.

The ICS interconnection box interconncts and distributes ICS and receiver audio. Sonobuoy audio switching assembly SA-1605/AAR-72 provides PIC-channel 18 high-audio for distribution on AUX lines.

a. The MASTER CONTROL AUX RCVR control connects the receiver audio indicated by the switch positions to the AUX RECEIVER SEL switches on the ICS master control panels. (The SPARE 1, 2, 3, and 4 positions are currently not used).

Note

The MASTER CONTROL AUX RCVR control must be on SONO position for all ICS master control panels (AUX selected) to receive PIC-channel 18 audio.

b. The CREW CONTROL AUX RCVR control connects the receiver audio indicated by the switch position to the AUX RECEIVER SEL switches on the ICS crew control panels. (The HF-3, SPARE 1, 2, 3, and 4 positions are currently not used.)

Note

The CREW CONTROL AUX RCVR control must be in the SONO position for all ICS crew control panels (AUX selected) to receive PIC 18 audio.

c. The 3/4 AMP FUSE provides circuit protection for the ICS interconnect box. SPARE should contain a spare fuse.

d. The INCOMING AUDIO LEVEL controls adjust the audio levels of all incoming receiver audios except SONO.

COMMAND BELL.

The command bell provides a means of notifying the aircraft crewmembers to prepare for bailout (four short rings) and to bail out (one long ring).

Power is supplied from the 28-volt flight essential dc bus through the COMMAND BELL circuit breaker located in the forward load center.

Five command bells are located throughout the aircraft, one each, at the following electronic racks: Racks F1, H3, G2, D1, and B1.

Command Bell Switch.

The COMMAND BELL switch is located in the center of the exterior lights control panel. The switch is a momentary-type that connects power to the five bells when pushed.

PART 3—AIRCRAFT SERVICING

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REFUELING

The P-3 aircraft is designed to be fueled by two methods, center point pressure fueling and over wing gravity feed. See figures 1-50 and 1-51 for fuel quantities and specifications.

Note

Due to wing dihedral, the filler wells must be located near the high outboard end of the engine feed tanks. Consequently, dipsticking through the filler wells will yield a no-reading indication unless the inboard tanks contain 4224 pounds (650 gallons) of fuel or more, and the outboard tanks contain 8775 pounds (1350 gallons) of fuel or more.

CENTER-POINT PRESSURE FUELING.

The normal fueling for the P-3 aircraft will be accomplished with the center-point pressure system, designed to accept 600 gallons of fuel per minute from two fuel trucks pumping simultaneously. The aircraft can also be fueled by one truck but at a reduced rate of approximately 300 gallons per minute. The pressure fueling connectors and control panel are located on the lower surface of the starboard wing immediately forward of the flaps and just outboard of the fuselage. Fueling with APU operating is classified as normal refueling, not hot refueling.

WARNING

If during pressure fueling cycle any of the following occur, (1) wing tank overfilled, (2) wing tank fuel spillage from a wingtip vent, or (3) loud or unusual noise accompanied by wing vibration, fueling must be halted immediately and an inspection of the internal wing structure (WS 380 through WS 465) for structural damage must be accomplished prior to next flight.

CAUTION

To prevent structural damage, verify positive fuel tank venting and ensure that fueling pressure does not exceed 55 psi.

OVERWING GRAVITY FEED.

Although it is intended that the aircraft be normally refueled by pressure filling methods, it may also be fueled through the overwing gravity filler wells in each main wing tank. The center section and fuselage tank does not incorporate a gravity filler well.

FUEL DENSITY VERSUS TEMPERATURE.

Fuel quantity indication can vary even though the aircraft is serviced with the same number of gallons of fuel. The

SERVICING QUANTITIES

	U.S. GAL	*IMP GAL*	*LITERS*	*POUNDS**		
FUEL (Specification JP-4, JP-5 and JP-8)				(JP-4) @ 6.5 lb/gal	(JP-5) @ 6.8 lb/gal	(JP-8) @ 6.7 lb/gal
Tank No. 5	2646	2203.32	10,015.11	17,199	17,993	17,728
Inboard Tanks (two)	1671 (ea)	1391.44	6,324.74	10,861	11,363	11,196
Outboard Tanks (two)	1606 (ea)	1337.32	6,078.71	10,439	10,921	10,760
Total	9200	7660.84	34,822.01	59,800	62,560	61,640
HYDRAULIC FLUID (Specification MIL-H-83282; MIL-H-5606 Alternate)						
Hydraulic System No. 1	16.20	13.49	61.32			
Hydraulic System No. 2	4.50	3.75	17.03			
Hydraulic System Reservoir No. 1	5.60	4.66	21.19			
Hydraulic System Reservoir No. 2	1.00	0.83	3.78			
Bomb Bay Door Emergency	0.75	0.60	2.25			
PROPELLER FLUID (Specification MIL-H-83282; MIL-H-5606 Alternate)						
Propeller Fluid Reservoir	6.20	5.16	23.47			
ENGINE OIL (Specification MIL-L-23699, MIL-L-7808)†						
Engine, Model T56 (four)	8.65 (ea)	7.20	32.88			
Cabin Air Compressor (two)	1.00 (ea)	0.83	3.78			
Auxiliary Power Unit	1.00	0.83	3.78			
Starter (Hamilton Standard)††	0.031 (4 fl oz) (ea)	0.026	0.118 (118 cc)			
Starter (AiResearch)††	0.112 (14.4 fl oz) (ea)	0.094	0.425 (425 cc)			
WINDSHIELD WASHER FLUID (Specification MIL-F-5566 — Isopropyl Alcohol TT-1-735)						
Windshield Washer (20 percent water, 80 percent alcohol; 100 percent alcohol — optional)	1.00	0.83	3.785			
OXYGEN (Specification MIL-O-27210B) 1800 psi (1500 psi minimum at 70°F). See NAVAIR 01-75-PAA-2-2.3, figure 3-3 for temperature versus pressure table.						
REFRIGERATION UNIT (Specification MIL-L-6085) — Capacity 0.7 pint (340 cc)						
AIR MULTIPLIER PACKAGE (Specification MIL-L-6085) — (Air Conditioning) Capacity 8.45 oz.						
TIRES						
At 80,000-lb gross takeoff weight inflate nose tires to 150 psi and main gear tires to between 110 and 180 psi.						
At 127,500-lb gross takeoff weight inflate nose tires to 150 psi and main gear tires to 180 psi.						
At 135,000-lb gross takeoff weight inflate nose tires to 150 psi and main gear tires to 190 psi.						
Nosewheel	Tire size 28 x 7.7, 12-ply rating, VII Tubeless High Speed.					
Main Wheels	Tire size 40 x 14, 28-ply rating, VII Tubeless High Speed.					

Note

*Specific gravity of fuel varies. Hydrometer readings are required for accurate calculations.
†When start temperatures below -40°C (-40°F) are anticipated, MIL-L-7808 should be used in lieu of MIL-L-23699.
††One starter per engine, four per aircraft (may be intermixed).

Figure 1-50. Servicing Quantities

FUEL AVAILABILITY CHART

NATION	GRADE, NATO SYMBOL, AND NATIONAL SPECIFICATION OF APPLICABLE FUELS								
	PRIMARY FUELS			*EMERGENCY ALTERNATE FUELS§*					
				Aviation Gasoline			*Kerosene*		
	JP-4	*JP-5*	*JP-8*	*MIL-G-5572*			*High Flash*	*Low Flash*	
NATO SYMBOL	F-40	F-44	F-34	80/87 F-12	100/130 F-18	115/145 F-22	F-42	F-30	F-34
UNITED STATES	MIL-T-5624L (JP-4)*	MIL-T-5624L (JP-5)	MIL-T-83133A (JP-8)	MIL-G-5572D	MIL-G-5572D	MIL-G-5572D		ASTM-D 1655-62T (JET A)‡	ASTM-D 1655-66T (JET A-1)
BELGIUM	BA-PF-2B			BA-PF-5 AM.1	BA-PF-5 AM.1	BA-PF-5 AM.1			
CANADA	3-GP-22f	3-GP-24e		3-GP-25e	3-GP-25e	3-GP-25e			3-GP-23f
DENMARK	MIL-T-5624L AM.1			MIL-G-5572D	D. ENG Rd 2485 Iss 6	D. ENG Rd 2485 Iss 6			D. ENG Rd 2453 (AVTUR 50)
FRANCE	AIR 3407/A			AIR 3401/G	AIR 3401/G	AIR 3401/G	AIR 3401/G		AIR 3405/B
GERMAN FED. REP.	VTL-9130/ 006 AM.2	VTL-9310/ 007		VTL-9130/ 001	VTL-9130/ 003	VTL-9130/ 004			
GREECE	MIL-T-5624L	AM-C-143		MIL-G-5572D	MIL-G-5572D				
ITALY	AM-C-142f			AM-C-102C	AM-C-104C	AM-C-105C			
NETHER-LANDS	MIL-T-5624L AM.1 (JP-4)			MIL-G-5572D	MIL-G-5572C	MIL-G-5572D			
NORWAY	D. ENG R 2454 (AVTAG)			MIL-G-5572D	D. ENG Rd 2485 Iss 6	MIL-G-5572D			
PORTUGAL	MIL-T-5624L AM.1 (JP-4)			MIL-G-5572D	MIL-G-5572D				
TURKEY	MIL-T-5624L AM.1 (JP-4)			MIL-G-5572D	MIL-G-5572D	MIL-G-5572D			
UNITED KINGDOM	D. ENG Rd 2454 (AVTAG)**	D. ENG Rd 2498 Iss 3 (AVCAT 48)			D. ENG Rd 2485 Iss 6	D. ENG Rd 2485 Iss 6			D. ENG Rd 2453 (AVTUR50)‡‡

Note

- The use of any fuel not specified requires post flight inspection until it has been determined that there are no harmful effects from its use.
- Use of gasoline MIL-G-5572( ) may require adjustment of the fuel control governor for satisfactory pitch-lock and governor check. Low speed ground idle adjustment may also be required and blowout is possible during engine speed reset operation in the taxi range.

CAUTION

Fuels that contain tricresyl phosphate are not approved for use as an alternate emergency fuel. If for any reason gasoline with suspected TCP additive is used as an emergency fuel, the "hot section" of the engine should be inspected at the completion of the flight.

§ Refer to NAVAIR Instruction 10341.1 (series) and NAVAIR Instruction 10300.1 (series) for additional information concerning emergency/alternate fuels.

*Jet B available at commercial airports in CONUS is similar to JP-4 but does not contain fuel system icing inhibitor (FSII).

**AVTAG without FSII is available in U.K. as F-45.

‡Same as Jet A-1 except freezing point is -38° F instead of -54° F.

‡‡AVTUR 50 without FSII available in U.K. as F-35.

Figure 1-51. Fuel Availability Chart

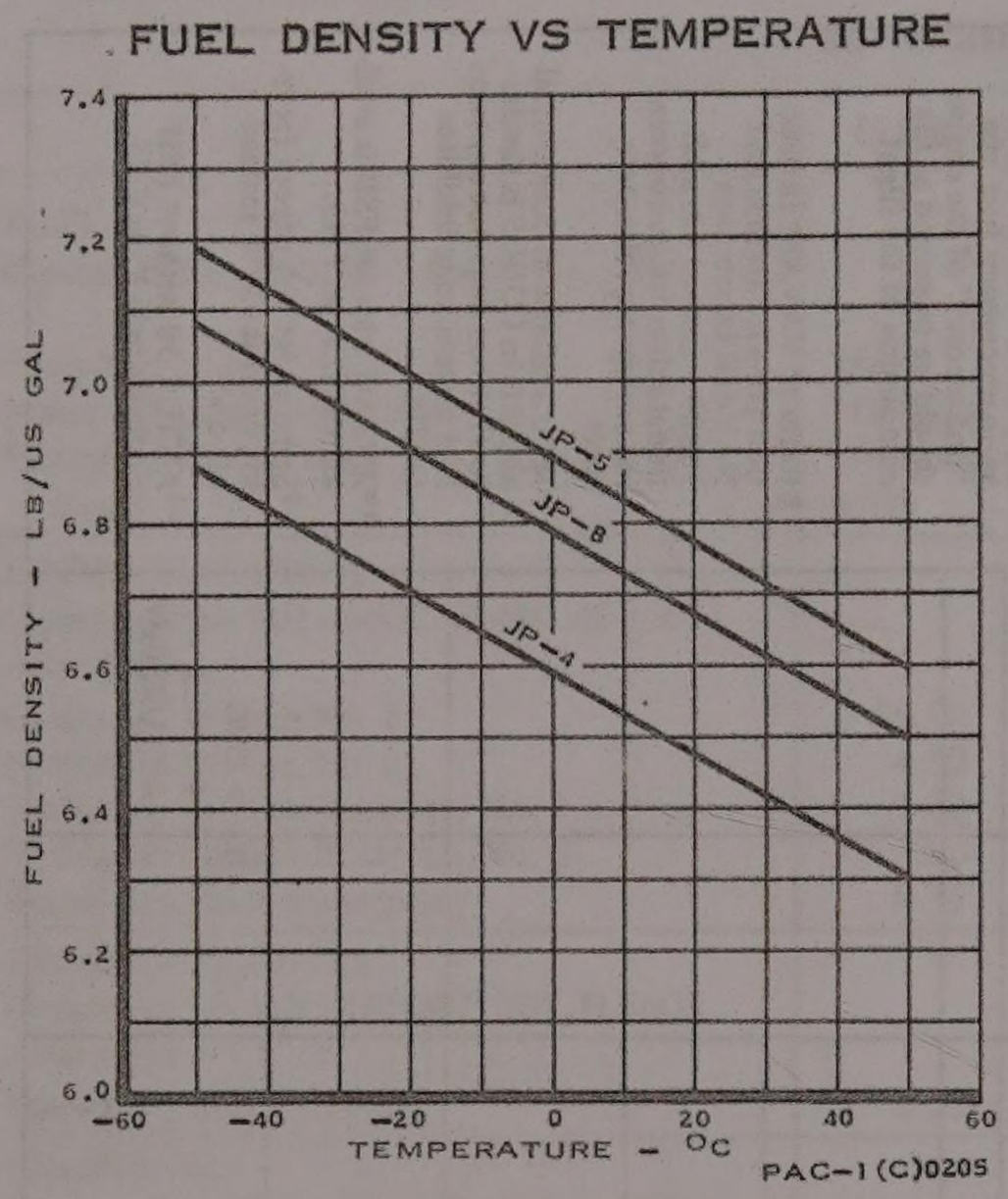


Figure 1-52. Fuel Density vs Temperature

factors that cause the fuel weight to change with a constant quantitiy are temperature and fuel density tolerances. Figure 1-52 shows the variation of fuel density with temperature for nominal JP-4, JP-5, and JP-8 fuel. Fuel production specifications for JP-4 and JP-5 permit a density range of ±0.2 pounds per US gallon. JP-8 fuel specification allows a density range of ±0.25 pounds per US gallon. For example, although JP-4 has a nominal fuel density of 6.5 pounds per US gallon at 15°C, it can vary from 6.3 to 6.7 pounds per US gallon at this temperature. For accurate mission planning, the combined effect of initial fuel density and temperature must be considered for the fuel on board. Assuming the fuel being used has an initial fuel density of 6.3 pounds per US gallon at 15°C; the same fuel at a temperature of 40°C has a density of 6.15 pounds per US gallon. For an aircraft with 9200 gallons of fuel, the load would be 56,580 pounds as compared with 58,510 pounds for nominal JP-4 at the same temperature.

SERVICING INSTRUCTIONS.

Refer to figure 1-53 for instructions and servicing directives.

GROUND ENGINE AIRSTART UNIT.

Engine ground starting may be accomplished with a GTC-85 unit or other standard Navy air starting unit that will deliver a minimum of 90 pounds per minute air flow at 32 psig pressure. The performance rating of the GTC-85 unit is 110 pounds per minute air flow at a pressure of 37 psig and temperature of 360°F.

The ground air start connection is located in the lower surface of the starboard wing, adjacent to the fuselage, and is accessible through an external access door.

ELECTRICAL GROUND POWER UNIT.

The following ground power units are approved for use on P-3 aircraft:

MILITARY

1. Unlimited Use: MMG-1 NC-12A NC-10B
   RX-400 RY-400

2. Limited Avionics Support (30 KVA only): NC-2A
   MMG-2 NC-75 NC-7C
   MG-2 NC-7B NC-7A

3. Limited Avionics Support (45 KVA only): NC-8A

DANGER AREAS.

Certain ground operations can result in damage to equipment and injury to personnel if adequate safety precautions are not observed. The following areas (figure 1-54) are considered potentially hazardous:

Propeller Area.

The propeller arc is considered a hazardous area. Personnel and equipment should be kept clear.

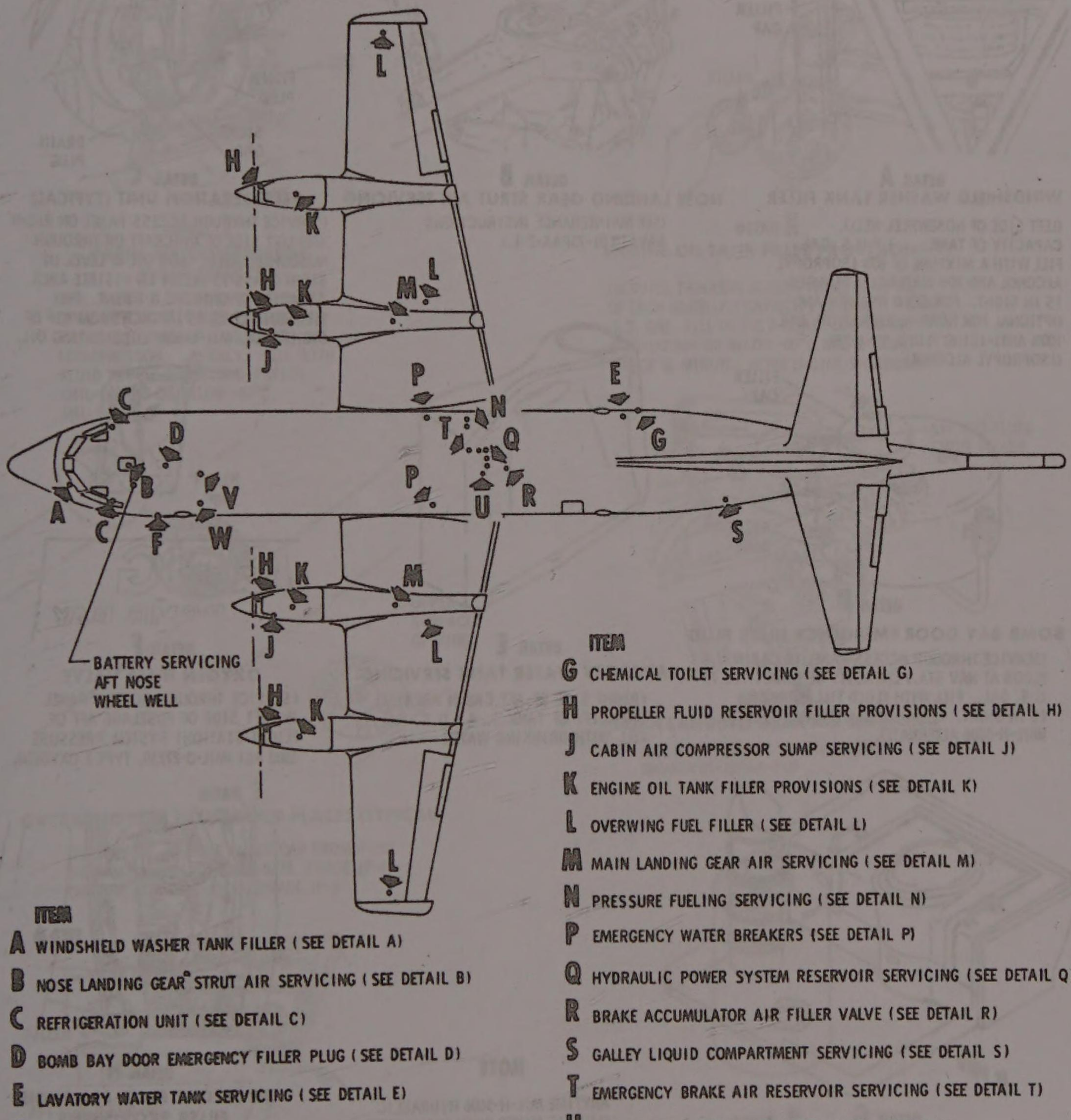
WARNING

When working on or in close proximity to any aircraft propellers, never walk directly through any propeller arc. The area between the fuselage and the number 2 or 3 propeller is considered a propeller arc hazard area and should always be avoided.

Propeller-Jet Blast Area.

Structural damage to other aircraft and support equipment and personnel injuries can be incurred by blast propelled objects and high exhaust temperatures.

SERVICING INSTRUCTIONS



ITEM

A WINDSHIELD WASHER TANK FILLER (SEE DETAIL A)

B NOSE LANDING GEAR STRUT AIR SERVICING (SEE DETAIL B)

C REFRIGERATION UNIT (SEE DETAIL C)

D BOMB BAY DOOR EMERGENCY FILLER PLUG (SEE DETAIL D)

E LAVATORY WATER TANK SERVICING (SEE DETAIL E)

F OXYGEN FILLER VALVE (SEE DETAIL F)

ITEM

G CHEMICAL TOILET SERVICING (SEE DETAIL G)

H PROPELLER FLUID RESERVOIR FILLER PROVISIONS (SEE DETAIL H)

J CABIN AIR COMPRESSOR SUMP SERVICING (SEE DETAIL J)

K ENGINE OIL TANK FILLER PROVISIONS (SEE DETAIL K)

L OVERWING FUEL FILLER (SEE DETAIL L)

M MAIN LANDING GEAR AIR SERVICING (SEE DETAIL M)

N PRESSURE FUELING SERVICING (SEE DETAIL N)

P EMERGENCY WATER BREAKERS (SEE DETAIL P)

Q HYDRAULIC POWER SYSTEM RESERVOIR SERVICING (SEE DETAIL Q)

R BRAKE ACCUMULATOR AIR FILLER VALVE (SEE DETAIL R)

S GALLEY LIQUID COMPARTMENT SERVICING (SEE DETAIL S)

T EMERGENCY BRAKE AIR RESERVOIR SERVICING (SEE DETAIL T)

U HYDRAULIC AC PUMP RESERVOIRS (SEE DETAIL U)

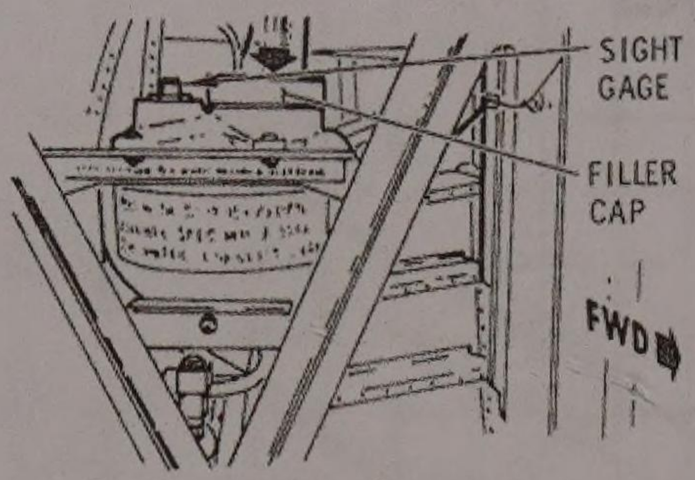
V AUXILIARY POWER UNIT (SEE DETAIL V)

W AIR MULTIPLIER PACKAGE SERVICING (SEE DETAIL W)

HH 252
F141-P-1-39

Figure 1-53. Servicing Instructions (Sheet 1 of 6)

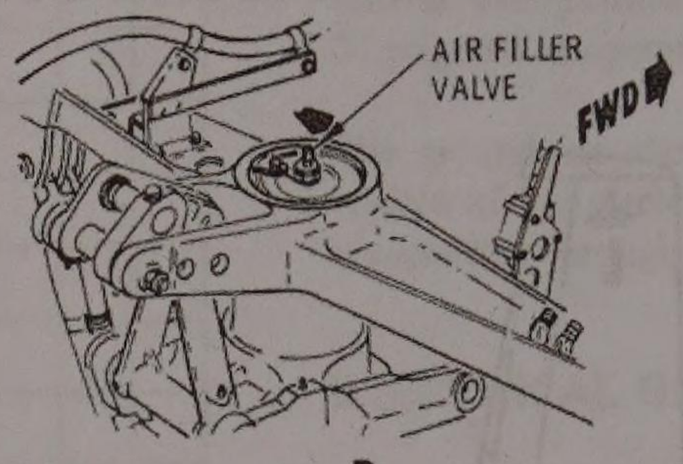
SERVICING INSTRUCTIONS (CONT)



DETAIL A
WINDSHIELD WASHER TANK FILLER

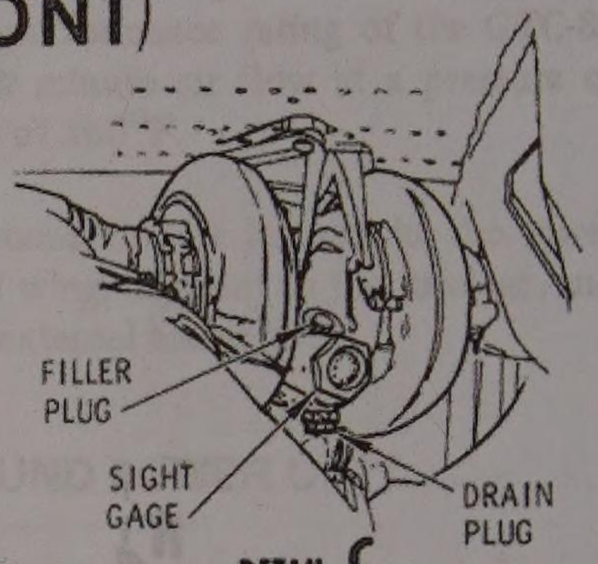
(LEFT SIDE OF NOSEWHEEL WELL).
CAPACITY OF TANK.....1.0 U.S. GAL.
FILL WITH A MIXTURE OF 80% ISOPROPYL ALCOHOL AND 20% WATER TILL PLUNGER IS IN SIGHT. FOR COLD WEATHER AND OPTIONAL FOR NORMAL OPERATION, USE 100% ANTI-ICING FLUID, TT-I-735 (ISOPROPYL ALCOHOL).

NEW



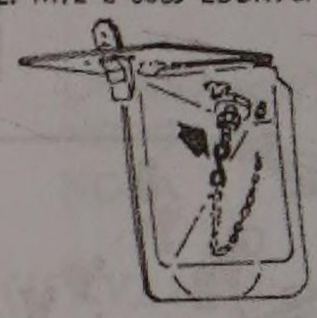
DETAIL B
NOSE LANDING GEAR STRUT AIR SERVICING

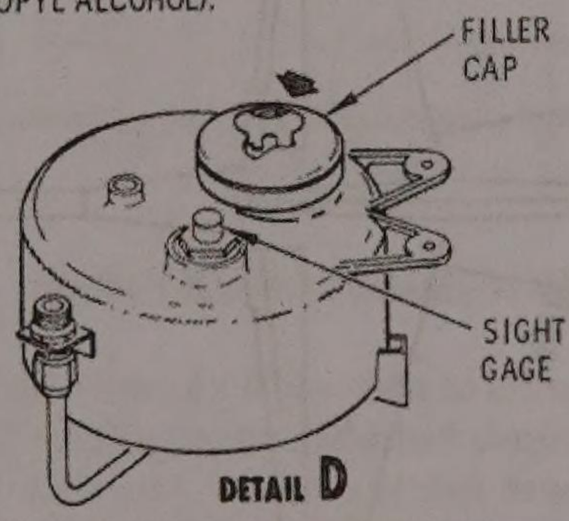
(SEE MAINTENANCE INSTRUCTIONS NAVAIR 01-75PAA-2-1.)



DETAIL C
REFRIGERATION UNIT (TYPICAL)

(SERVICE THROUGH ACCESS PANEL ON RIGHT AND LEFT SIDE OF AIRCRAFT OR THROUGH NOSEWHEEL WELL). ADD OIL IF LEVEL IN SIGHT GLASS IS BELOW 1/4 VISIBLE AREA. CAPACITY OF UNIT.....0.7 PINT. FILL TILL FLUID LEVEL IS 1/8 INCH FROM TOP OF SIGHT GAGE. MIL-L-6085 LUBRICATING OIL.

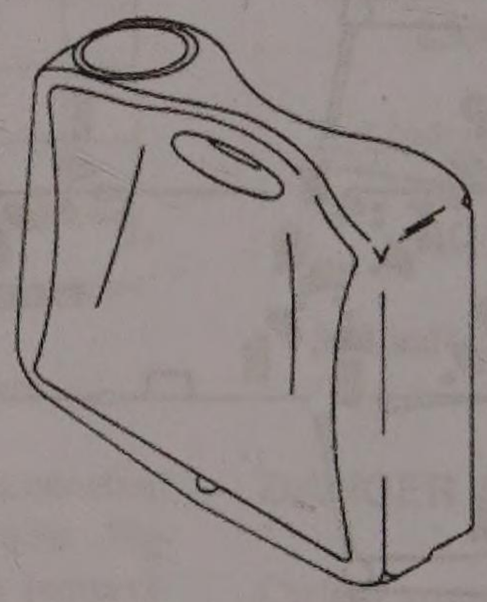




DETAIL D
BOMB BAY DOOR EMERGENCY FILLER PLUG

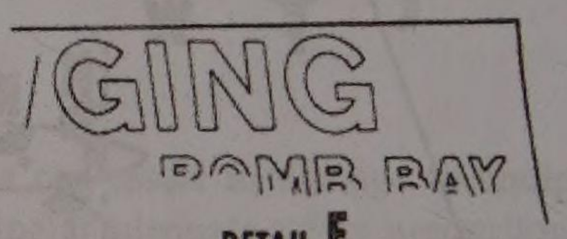
(SERVICE THROUGH ACCESS PANEL IN CABIN FLOOR AT NAV STA.) CAPACITY OF TANK.....0.75 U.S. GAL. FILL WITH FLUID TILL PLUNGER IS IN SIGHT. MIL-H-83282 HYDRAULIC FLUID (MIL-H-5606 ALTERNATE).

NEW



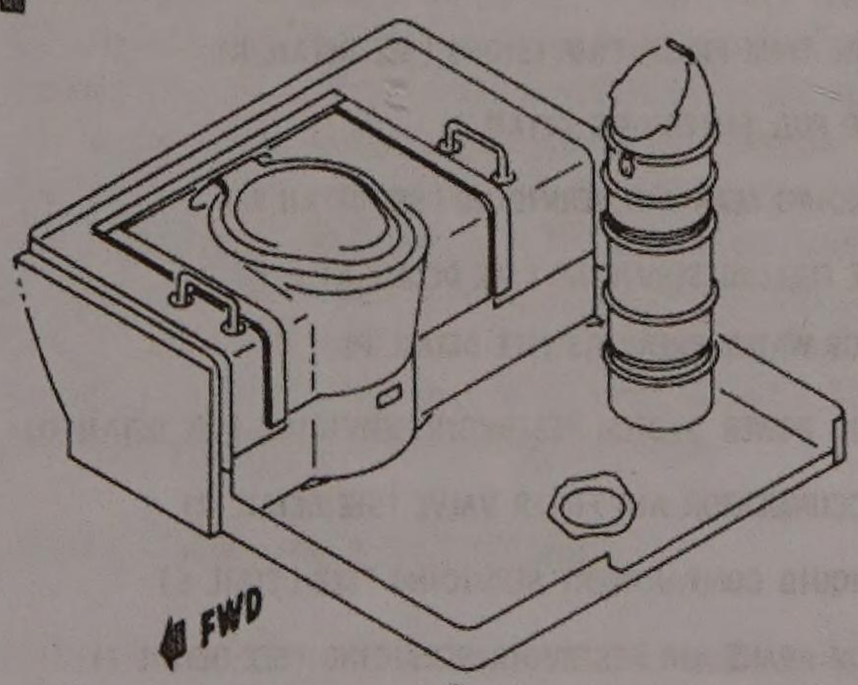
DETAIL E
LAVATORY WATER TANK SERVICING

(RIGHT SIDE OF AFT CABIN AREA).
CAPACITY OF TANK..... 4.5 U.S. GAL.
FILL WITH DRINKING WATER



DETAIL F
OXYGEN FILLER VALVE

(SERVICE THROUGH ACCESS PANEL IN LEFT SIDE OF FUSELAGE AFT OF FLIGHT STATION) SYSTEM PRESSURE 1800 PSI (MIL-O-27210, TYPE 1 OXYGEN).

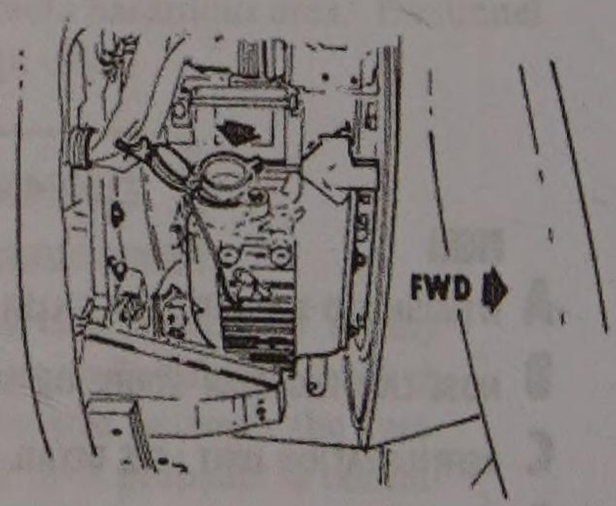


DETAIL G
CHEMICAL TOILET SERVICING

(RIGHT SIDE OF AFT CABIN AREA
CAPACITY OF TOILET.....6.0 U.S. GAL.
MIX 4 TO 6 OUNCES OF CHEMICALS TO 1 GALLON OF WATER.

NOTE

ANYTIME MIL-H-5606 HYDRAULIC FLUID IS MIXED WITH MIL-H-83282 FIRE RETARDANT CAPABILITIES ARE DEGRADED.



DETAIL H
PROPELLER FLUID RESERVOIR FILLER PROVISIONS

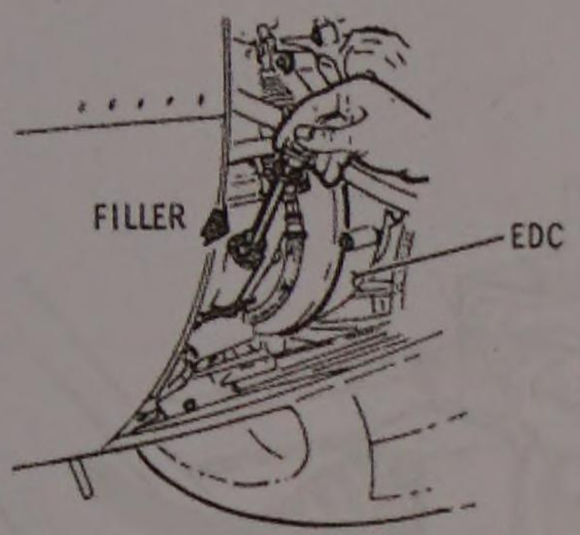
(SERVICE THROUGH ACCESS PANEL IN RIGHT SECTION OF PROPELLER AFTERBODY.) CAPACITY....6.2 U.S. GAL. FILL WITH FLUID TO SHELF IN FILLER WELL. MIL-H-83282 (MIL-H-5606 ALTERNATE).

NEW

PAC-1(C5)0216

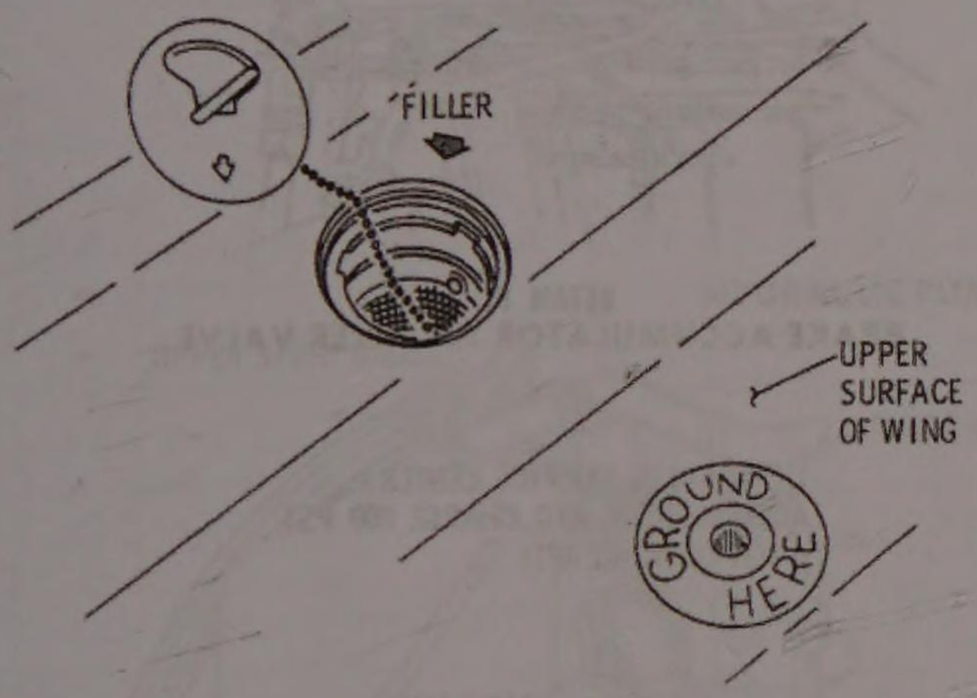
Figure 1-53. Servicing Instructions (Sheet 2 of 6)

SERVICING INSTRUCTIONS (CONT)



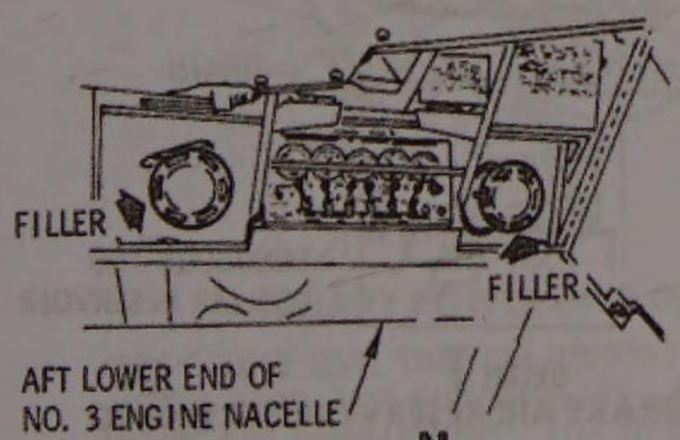
DETAIL J
CABIN AIR COMPRESSOR SUMP SERVICE

(NO. 2 AND 3 ENGINES) TO SERVICE, OPEN LEFT COWL PANEL ON ENGINE. CAPACITY OF SUMP.....0.7 U.S. GAL. (COMPRESSOR .1 GAL). FILL WITH FLUID TO FULL MARK ON DIPSTICK (MIL-L-23699 OR BELOW -40°C, MIL-L-7808)



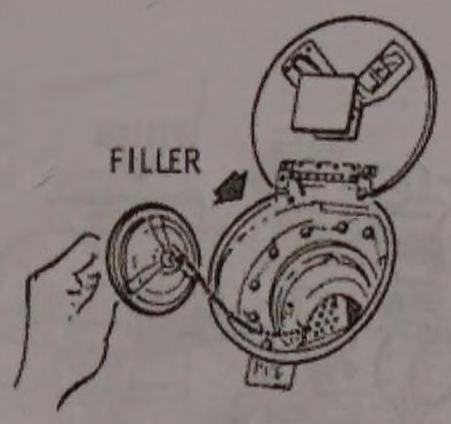
DETAIL L
OVERWING FUEL FILLER, FOUR PLACES (TYPICAL)

(TO SERVICE, REMOVE FILLER CAP FROM WING TANK BEING FUELED) MIL-T-5624, GRADE JP-4 OR JP-5, OR MIL-T-83133, GRADE JP-8



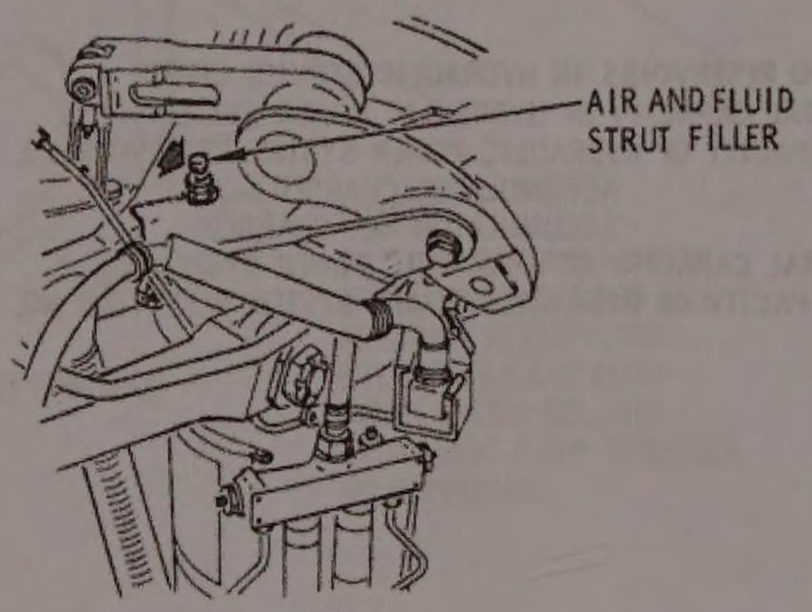
DETAIL N
PRESSURE FUELING SERVICING

(SERVICE THROUGH W5 ACCESS PANEL IN BOTTOM OF RIGHT WING) MIL-T-5624, GRADE JP-4 OR JP-5, OR MIL-T-83133, GRADE JP-8.



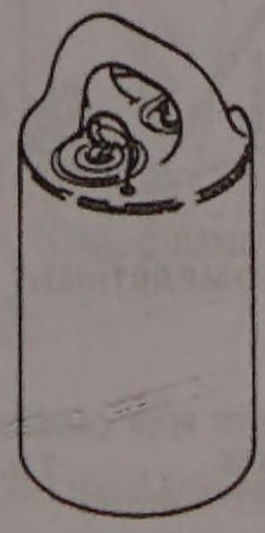
DETAIL K
ENGINE OIL TANK FILLER PROVISIONS

(SERVICE THROUGH ACCESS PANEL NEAR TOP OF EACH NACELLE.) CAPACITY OF TANK... 8.65 U.S. GAL. FILL TO THE 2-QUART LOW MARK (MIL-L-23699 OR BELOW -40°C, MIL-L-7808). CHECK 30 MINUTES AFTER ENGINE SHUTDOWN)



DETAIL M
MAIN LANDING GEAR AIR SERVICING

(SEE MAINTENANCE INSTRUCTIONS NAVAIR 01-75PAA-2-1)



DETAIL P
EMERGENCY WATER BREAKERS

FLUSH WITH CHLORINE SOLUTION, LET STAND FOR 4 HOURS, FLUSH WITH CLEAN WATER, REFILL WITH FRESH DRINKING WATER. CAPACITY....2.5 U.S. GALLONS

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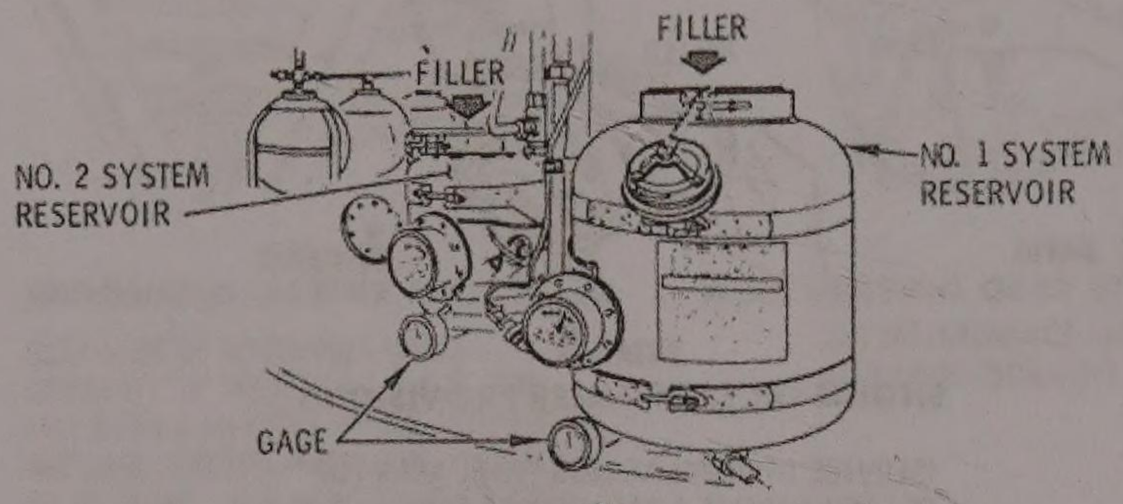
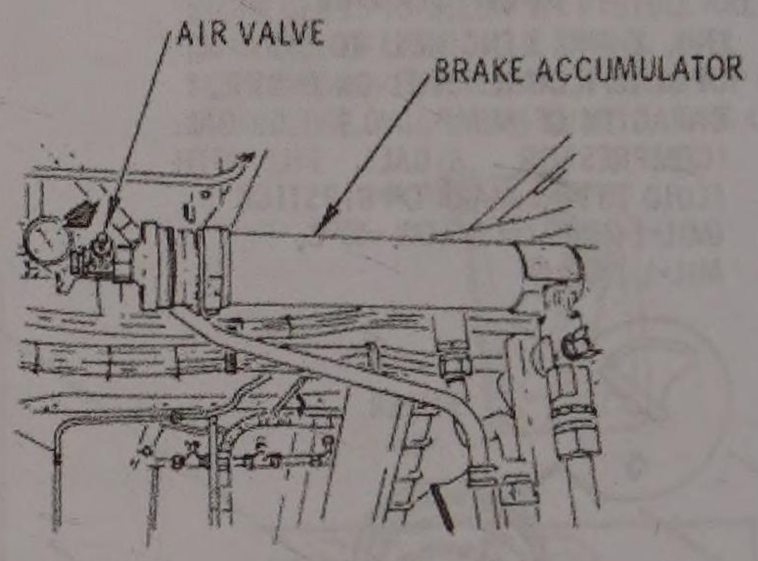
Figure 1-53. Servicing Instructions (Sheet 3 of 6)

SERVICING INSTRUCTIONS (CONT)



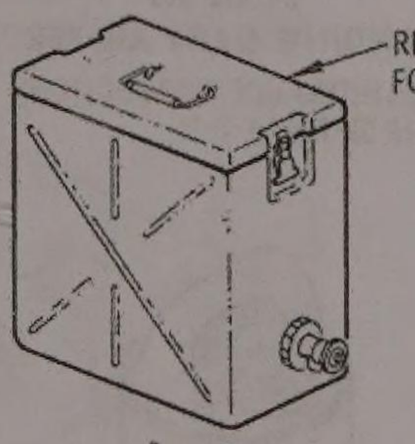
DETAIL Q
HYDRAULIC POWER SYSTEM RESERVOIR SERVICING (TYPICAL)

TWO RESERVOIRS IN HYDRAULIC SERVICE CENTER
TOTAL CAPACITY OF HYDRAULIC POWER SYSTEM NO. 1 . . . . . 16.2 U.S.GAL
CAPACITY OF HYDRAULIC POWER SYSTEM RESERVOIR NO. 1
ACCUMULATOR CHARGED . . . . . 5.0 U.S.GAL
ACCUMULATOR NOT CHARGED. . . . . 5.6 U.S.GAL
TOTAL CAPACITY OF HYDRAULIC POWER SYSTEM NO. 2 . . . . . 4.5 U.S.GAL
CAPACITY OF HYDRAULIC POWER SYSTEM RESERVOIR NO. 2. . . 1.0 U.S.GAL



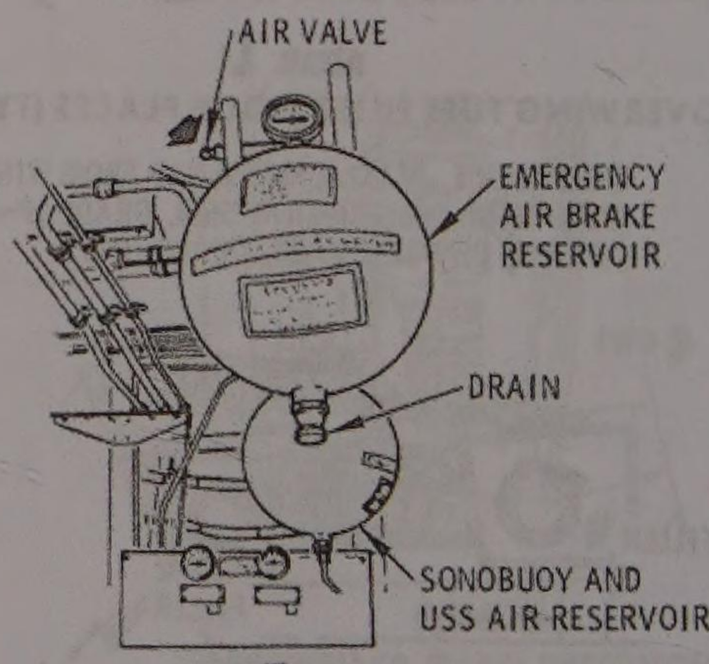
DETAIL R
BRAKE ACCUMULATOR AIR FILLER VALVE

(HYDRAULIC SERVICE CENTER)
ACCUMULATOR AIR CHARGE 800 PSI
(VIEW LOOKING AFT)



DETAIL S
GALLEY LIQUID COMPARTMENT SERVICING

(RIGHT SECTION OF REAR CABIN AREA)
CAPACITY OF TANK . . . . . 2 U.S.GAL
FILL WITH DRINKING WATER



DETAIL T
EMERGENCY BRAKE AIR RESERVOIR SERVICING

(IN HYDRAULIC SERVICE CENTER)
SYSTEM AIR CHARGE 1900 PSI MINIMUM
TO 3000 PSI MAXIMUM

NEW

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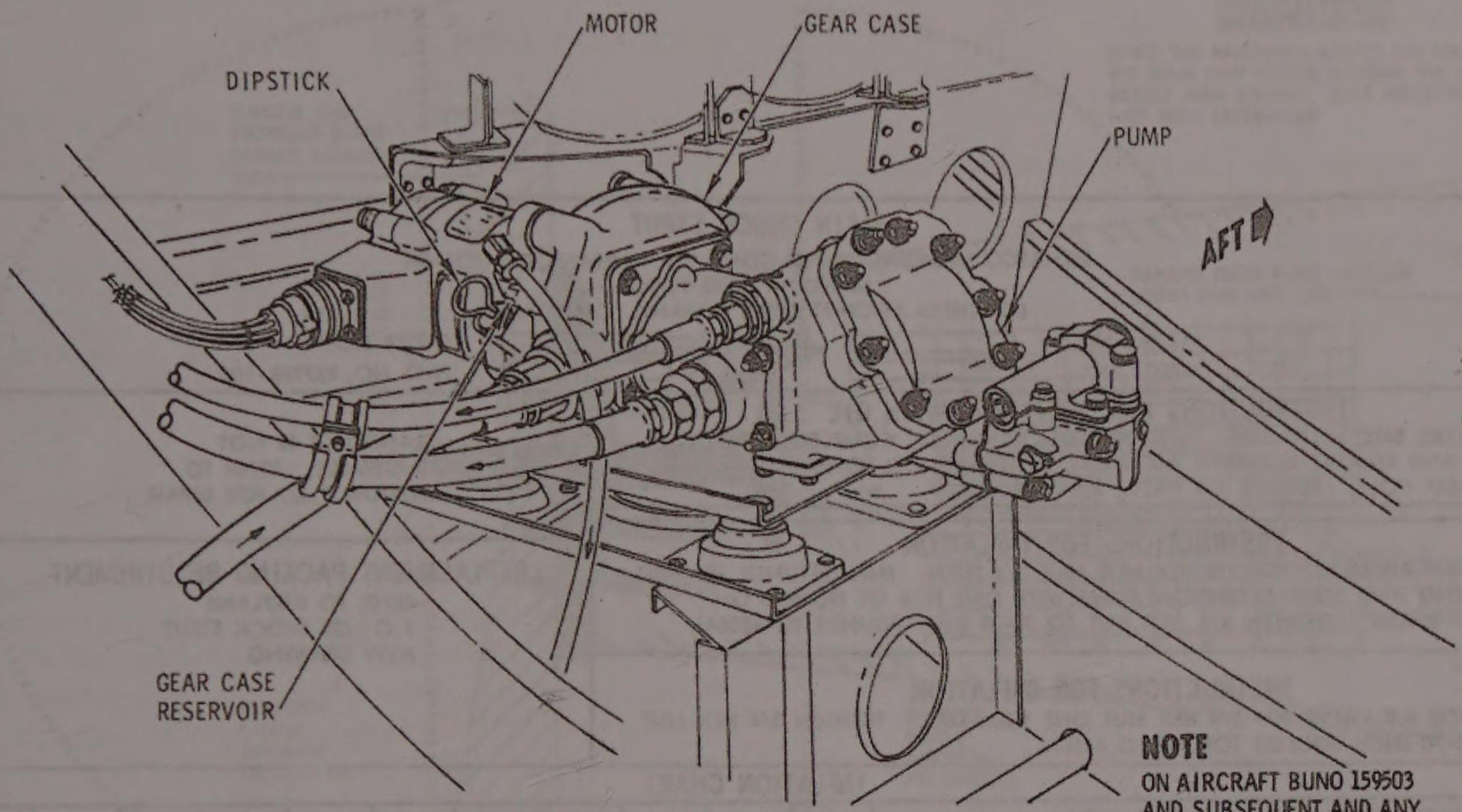
Figure 1-53. Servicing Instructions (Sheet 4 of 6)

SERVICING INSTRUCTIONS (CONT)

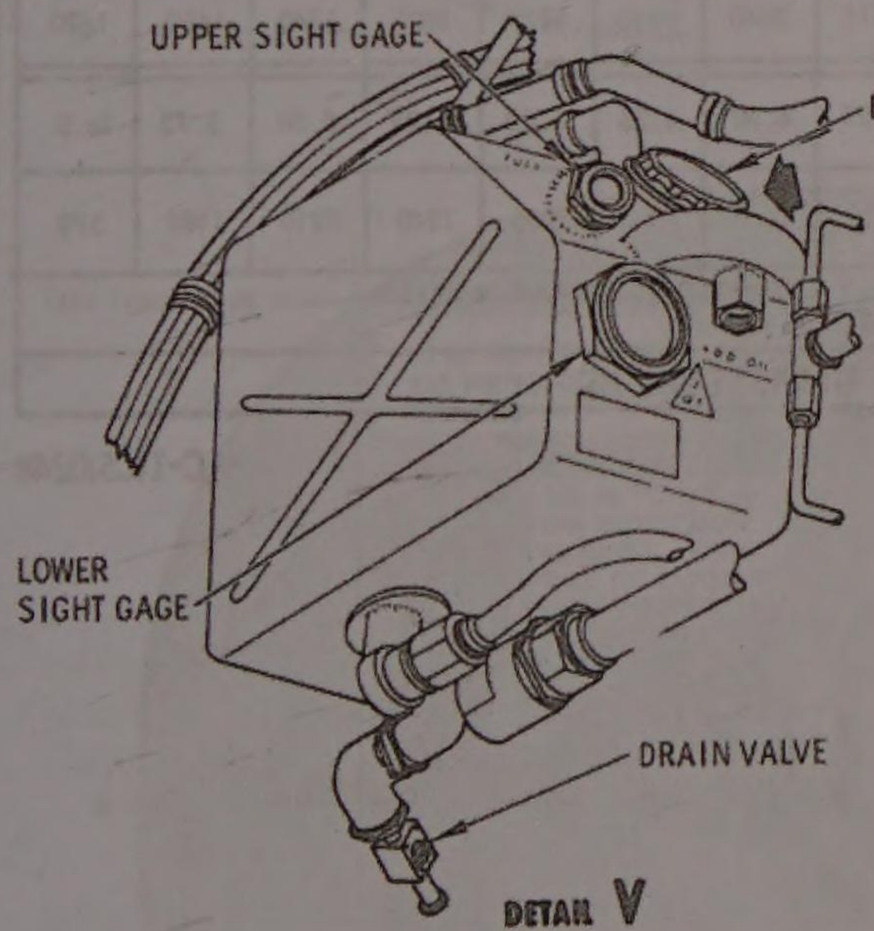


DETAIL U

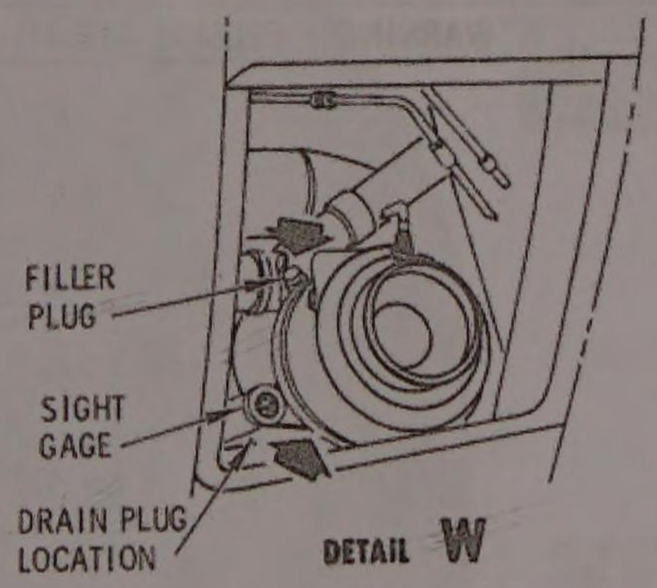
HYDRAULIC PUMP INSTALLATION (TYPICAL)

NOTE

ON AIRCRAFT BUNO 159503 AND SUBSEQUENT AND ANY AIRCRAFT RETROFITTED WITH HYDRAULIC PUMP MODEL EA1320-077, THE HYDRAULIC PUMP REQUIRES NO SERVICING.



DETAIL V



DETAIL W

AUXILIARY POWER UNIT OIL TANK

CHECK FLUID LEVEL THROUGH HINGED FIRE FIGHTING ACCESS DOOR, LEFT SIDE FUSELAGE. SERVICE FROM INSIDE APU COMPARTMENT. FILL TO FULL MARK ON UPPER SIGHT GAGE. CAPACITY OF TANK...1.0 U.S. GAL. (MIL-L-23699 OR BELOW -40°C, MIL-L-7808).N10 OIL CAN SPOUT USED FOR FILLING.

AIR MULTIPLIER PACKAGE

CHECK FLUID LEVEL THROUGH HINGED DOOR LEFT SIDE FUSELAGE. FILL TILL FLUID LEVEL IS WITHIN 1/8 INCH FROM TOP OF SIGHT GAGE. MIL-L-6085 LUBRICATING OIL. CAPACITY OF UNIT. . . .8.45 OZ

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Figure 1-53. Servicing Instructions (Sheet 5 of 6)

SERVICING INSTRUCTIONS (CONT)

MAIN SHOCK STRUT

MENASCO MANUFACTURING COMPANY, BURBANK, CALIFORNIA
MANUFACTURED FOR
LOCKHEED AIRCRAFT CORP. BURBANK, CALIFORNIA

SERIAL NO. _____ LOCKHEED _____ ORDER NO.
SPEC. NO. _____ _____ PART NO. 937958-103

INSTRUCTIONS FOR SERVICING WITH OIL

USE FLUID SPEC MIL-H-5606. WITH WEIGHT ON WHEELS, COMPLETELY DEFLATE STRUT AND REMOVE MS28889-1 AIR VALVE. FILL WITH OIL TO LEVEL OF FILLER HOLE. REPLACE AIR VALVE PER AND 10071.

GLAND NUT IS NOT ADJUSTABLE. REFER TO AIRPLANE T.O. FOR REPAIR

INSTRUCTIONS FOR INFLATION

LOOSEN AIR VALVE TOP 3/4 HEX NUT MAX 3/4 TURN. INFLATE UNTIL PRESSURE READING AND STRUT EXTENSION AGREE WITH ONE PAIR OF FIGURES ON CHART BELOW. TIGHTEN 3/4 HEX NUT TO 50-70 INCH POUNDS TO RESEAL

REPLACEMENT PACKING REQUIREMENT

REFER TO AIRPLANE T.O. OR SHOCK STRUT ASSY DRAWING

INSTRUCTIONS FOR DEFLATION

LOOSEN AIR VALVE TOP 3/4 HEX NUT ONE TURN MAX TIGHTEN 3/4 HEX NUT TO 50-70 INCH POUNDS TORQUE TO RESEAL.

INFLATION CHART

DISTANCE FROM LOWER SURFACE OF CYLINDER TO BOTTOM OF RED LINE ± 0.13	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25
SHOCK STRUT PRESSURE ± 50 PSI	2480	2340	2240	2115	2040	1940	1875	1800	1740	1680	1620
DISTANCE FROM LOWER SURFACE OF CYLINDER TO BOTTOM OF RED LINE ± 0.13	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	16.5
SHOCK STRUT PRESSURE ± 50 PSI	1560	1500	1460	1410	1360	1320	1280	1240	1210	1180	570

OPTIONAL METHOD — WITH OLEO COMPLETELY EXTENDED (20") AND WHEELS FREE OF GROUND, INFLATE TO

WARNING - RELEASE AIR IN STRUT BEFORE DISASSEMBLING

NEW NEW NEW NEW NEW NEW NEW NEW NEW NEW NEW NEW

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Figure 1-53. Servicing Instructions (Sheet 6 of 6)

DANGER AREAS

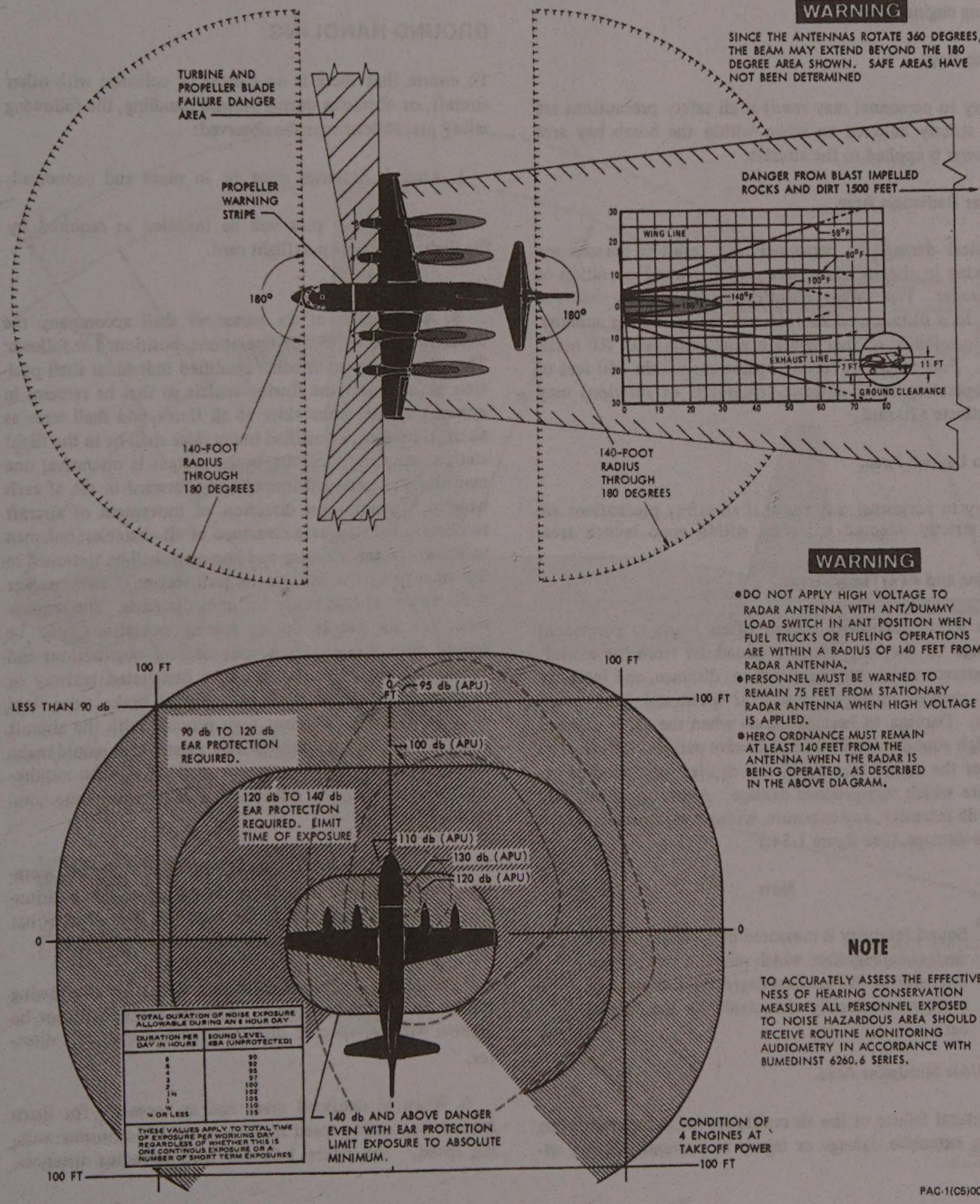

Figure 1-54. Danger Areas

Engine Compressor and Turbine Area.

Engine failure could result in blades being thrown from the engine radially at high velocity. Keep personnel clear during engine run-up.

Bomb Bay.

Injury to personnel may result if all safety precautions are not strictly adhered to when within the bomb bay area if power is applied to the aircraft.

Radar Radiation Area.

Physical damage to personnel may result if persons are working in the radiation area during ground operation of the radar. The APS-115 antenna may radiate harmful rays to a distance of 75 feet with a nonrotating antenna. The possibility of fuel ignition also exists with RF radiation. Fuel trucks or fueling operations within 140 feet of an operating radar antenna (regardless of rotation) may constitute a hazard.

Sono Launch Area.

Injury to personnel may result if all safety precautions are not strictly adhered to when within sono launch area.

Engine and APU Noise Areas.

High sound intensities (noise) often result in permanent damage to the ear. Noise is broadcast from the aircraft in patterns which vary in direction, distance, and intensity with changes in engine and APU speed and wind conditions. Damage to hearing occurs when the ear is exposed to high sound intensities for excessive periods of time. The higher the sound intensities, the shorter the period of exposure which will produce damage. Above approximately 140 db intensity, any exposure, without ear protection, can cause damage. (See figure 1-54.)

Note

Sound intensity is measured in decibels (db). A decibel is a number which relates a given sound intensity to the smallest degree of difference of loudness ordinarily detectable to the human ear.

APU/Air Multiplier Area.

Structural failure of the air multiplier turbocompressor can cause extensive damage or injury to personnel in the adjacent area. The turbocompressor inlet duct will thermoform or melt and cannot withstand reverse air flow at high temperatures (above 325°F). Therefore, do not restrict compressor inlet airflow, as failure of the unit may result.

GROUND HANDLING.

To ensure that there is no danger of collision with other aircraft, or obstacles during ground handling, the following safety precautions must be observed:

1. Aircraft batteries must be in place and connected.

2. Landing gear pins will be installed as required by the flight engineer's postflight card.

3. A minimum of six personnel shall accompany the aircraft during all towing operations, positioned as follows: The flight engineer or other qualified individual shall position himself near the towing vehicle so that he remains in eyesight of the brake rider at all times, and shall serve as aircraft director; a qualified brake rider shall be in the flight station, ensuring that the brake system is operative; one man shall be stationed immediately forward or aft of each wingtip depending on direction of movement of aircraft to observe for adequate clearance of all obstacles; one man to act as tractor operator and one man shall be stationed in the vicinity of the MAD cone (tail section). Each walker shall carry a whistle ready for immediate use. The requirement for six people during towing operations may be waived once the aircraft is well clear of obstructions and established on the center line of a designated taxiway or runway. Once established, a qualified brake rider, taxi director, and tractor driver may proceed with the aircraft under tow. Local conditions may exist which would make wing walkers advisable, in which case the six-man requirement would remain in effect at the discretion of the commanding officer.

4. The aircraft director shall direct the towing operation, observing that the walkers are alert, properly positioned, and have whistles ready for use. He shall ensure that the tow vehicle driver does not use excessive speeds.

5. Sounding a whistle shall be a signal for the towing vehicle to stop immediately. Aircraft brakes will not be applied without specific direction from the aircraft director.

6. When in confined areas and as necessary for sharp maneuvers, towing speed shall be limited to a normal walking speed. See figure 1-55 for turning radius distances.

TURNING RADIUS

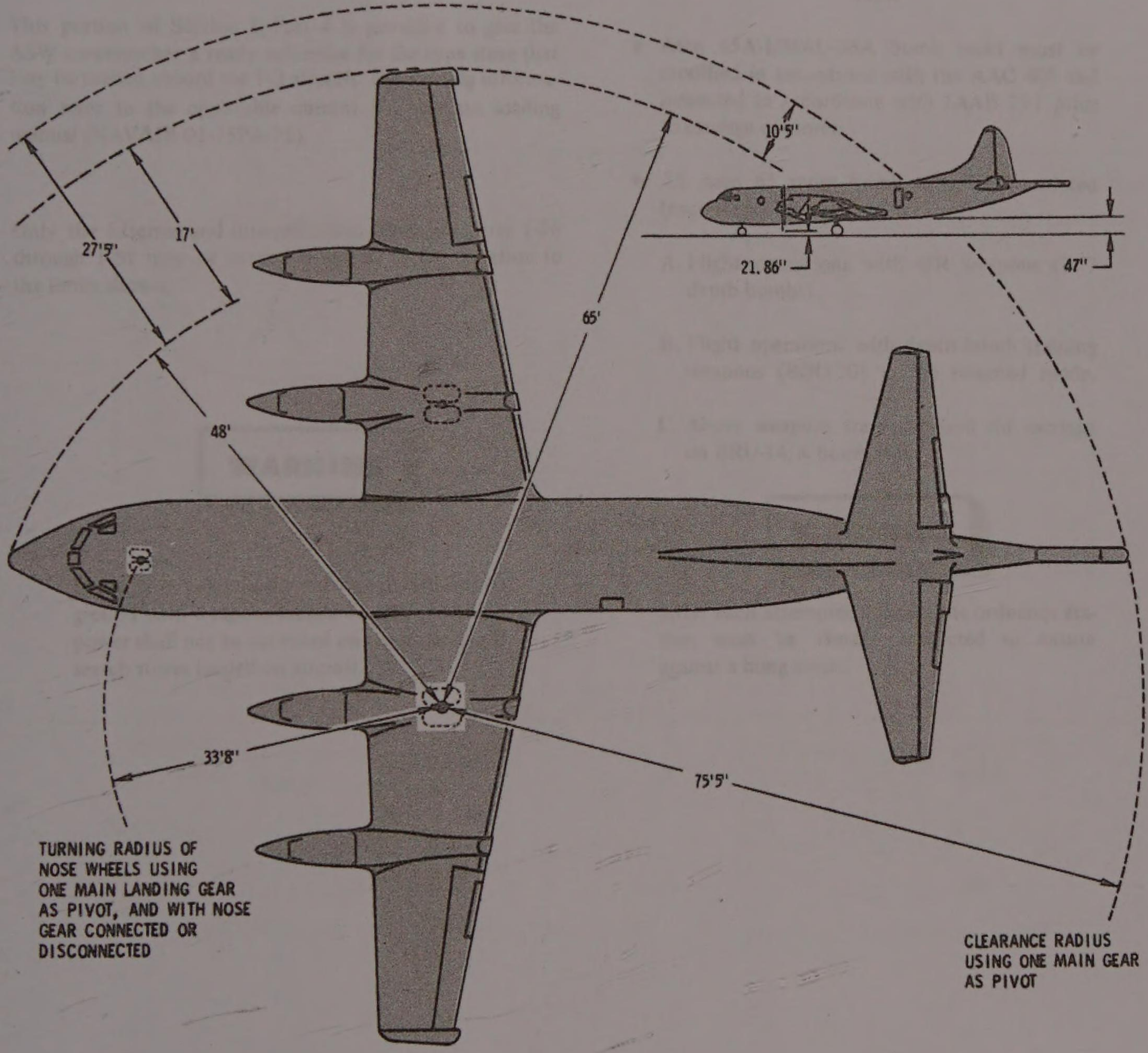

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Figure 1-55. Turning Radius

PART 4—STORES LIMITATIONS

INTRODUCTION.

This portion of Section I, Part 4 is provided to give the ASW crewmember a ready reference for the type store that may be carried aboard the P-3 aircraft. For loading information refer to the applicable current P-3 weapon loading manual (NAVAIR 01-75PA-75).

Only the external and internal stores listed in figures 1-56 through 1-61 may be carried singly or in combination to the limits shown.

WARNING

Master arm power shall not be activated on the ground with weapons loaded on aircraft. Search power shall not be activated on the ground with search stores loaded on aircraft.

Note

- Aero 65A-1/MAU-38A bomb racks must be modified in accordance with the AAC 408 and inspected in accordance with IAAB 391 prior to carriage of stores.

- All Aero 65 series bomb racks are restricted (except for emergency use) from:

  A. Flight operations with WR weapons (B57 depth bombs).

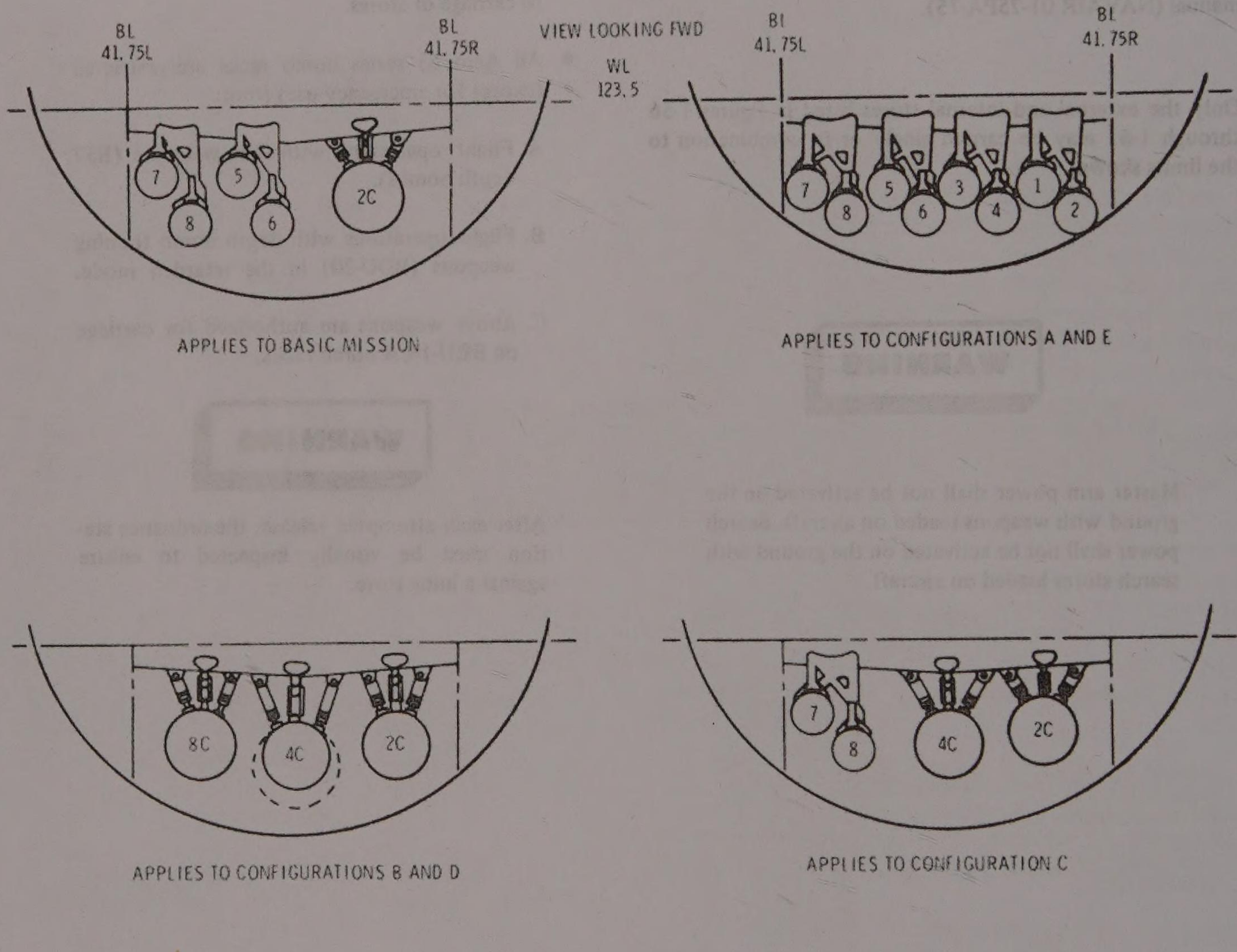
  B. Flight operations with depth bomb training weapons (BDU-20) in the retarded mode.

  C. Above weapons are authorized for carriage on BRU-14/A bomb racks.

WARNING

After each attempted release, the ordnance station must be visually inspected to ensure against a hung store.

BOMB BAY STORES LOADING CONFIGURATION



APPLIES TO BASIC MISSION

APPLIES TO CONFIGURATIONS A AND E

APPLIES TO CONFIGURATIONS B AND D

APPLIES TO CONFIGURATION C

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Figure 1-56. Bomb Bay Stores Loading Configuration

BOMB BAY LOADING TABULATION

CONFIG	STORE	TYPE	BOMB STATION										
			1	2	2C	3	4	4C	5	6	7	8	8C
BASIC MISSION	DEPTH BOMB	B57			X								
	TORPEDO	MK-46							X	X	X	X	
A	TORPEDO	MK-46	X	X		X	X		X	X	X	X	
	LD GP BOMB	MK-82 (INERT)	X	X		X	X		X	X	X	X	
	DESTRUCTOR	MK-36	X	X		X	X		X	X	X	X	
B	DEPTH BOMB	B57			X			X					X
	MINE	MK-52			X			X					X
	LD GP BOMB	MK-83 (INERT)			X			X					X
	DESTRUCTOR	MK-40			X			X					X
	INERT LAYING DUMMY MINE	MK-36			X			X					X
	INERT FLIGHT ACTUATION MINE	MK-52			X			X					X
C	DEPTH BOMB	B57			X			X					
	TORPEDO	MK-46									X	X	
D	MINE	MK-25						X					
	MINE	MK-55						X					
	MINE	MK-56						X					
E	SOUND UNDERWATER SIGNAL	MK-61		X			X			X		X	
	SOUND UNDERWATER SIGNAL	MK-64		X			X			X		X	
	SOUND UNDERWATER SIGNAL	MK-84		X			X			X		X	

Note

Shapes simulating configuration, weight and center-of-gravity of B57 (BDU-12, BDU-19, BDU-20C, and so forth) authorized provided ECP 814 incorporated which utilizes BRU-14 bomb racks.

NEW

Figure 1-57. Bomb Bay Loading Tabulation

P-3 INTERNAL STORES

KILL STORES

CONFIG	STORE	TYPE	WEIGHT (LB)	BOMB BAY STATIONS	QTY	AIRSPEED (KIAS) MAXIMUM IN FLIGHT	AIRSPEED (KIAS) MAXIMUM AT RELEASE	AIRSPEED (KIAS) MINIMUM AT RELEASE	ACCELERATION (G) IN FLIGHT	ACCELERATION (G) AT RELEASE	REMARKS
BASIC MISSION	DEPTH BOMB	B57	510	2C	1	LBA	330	140	-1.0 TO +3.0	+1.0	MAXIMUM RELEASE ALTITUDE, 1000 FEET. BDUs AUTHORIZED WITH BRU-14.
	TORPEDO	MK 46	604	5-6-7-8	4		350			+1.0	MAXIMUM RELEASE ALTITUDE, 550 FEET.
A	TORPEDO	MK 46	604	1-2-3-4-5-6-7-8	8		350			+1.0	MK 46 LIMITATIONS APPLY TO MODS 0, 1, 2, AND 5, AND TO THE POSITIVE BUOYANT EXERCISE TORPEDO (PBET) CONFIGURATION. MAXIMUM RELEASE ALTITUDE, 550 FEET.
	PRACTICE BOMB	MK 82 (INERT)	LD 531 SE/RET 572				LBA			+1.0	
	DESTRUCTOR	MK 36 MOD 3-7	LD 531 SE/ RET 572					SEE REMARKS	0.0 TO +3.0		REFER TO NAVORD OP-3529 FOR RELEASE LIMITATIONS.
B	DEPTH BOMB	B57	510	2C-4C-8C	3		330	140	-1.0 TO +3.0		MAXIMUM RELEASE ALTITUDE, 1000 FEET. BDUs AUTHORIZED WITH BRU-14.
	PRACTICE BOMB	MK 83 (INERT)	LD 985				LBA	180	0.0 TO +3.0	+1.0	
	DESTRUCTOR	MK 40 MOD 3-7	LD 985 SE/RET 1057					SEE REMARKS			REFER TO NAVORD OP-3529 FOR RELEASE LIMITATIONS.
	MINE	MK 36	SEE MINE CHART					180	-1.0 TO +2.0		SEE MINE CHART
	MINE	MK 52									
C	DEPTH BOMB	B57	510	2C-4C	2		330	140	-1.0 TO +3.0	+1.0	MAXIMUM RELEASE ALTITUDE, 1000 FEET. BDUs AUTHORIZED WITH BRU-14.
	TORPEDO	MK 46	604	7-8			350				MAXIMUM RELEASE ALTITUDE, 550 FEET.
D	MINE	MK 25	SEE MINE CHART	4C	1		LBA	180	-1.0 TO +2.0	+1.0	UNFAIRED CONFIGURATION ONLY. REFER TO MINE CONFIGURATION CHART.
	MINE	MK 55									
	MINE	MK 56									
E	SOUND UNDERWATER SIGNAL	MK 61 MK 64 MK 84	6.8 6.8 6.0	2-4-6-8	4		340		LBA	+1.0	REQUIRES USE OF BOMB RACK ADAPTER ADU-369/A ON MAU-38, BRU-12, AND AERO 65A BOMB RACKS. SEE NOTES.

Figure 1-58. P-3 Internal Stores (Sheet 1 of 3)

P-3 INTERNAL STORES (Cont)

Sonobuoy												
AN/SSQ	36	41A	41B	47B	50	50A	53	53A	57A	62	71	83
SIZE	A	A	A	A	A	A	A	A	A	A	A	A
HYDROPHONE DEPTH (FT)	THERMAL PROBE TO 1000	60 OR 300	60 OR 1000	60 OR 800	60 OR 1500	60 OR 1500	90	90 OR 1000	60 OR 300	60 OR 1500	350	SURFACE RADIUS 20
LIFE (HR)	0.1	1 OR 3	1 OR 3 OR 8	0.5	1 MAX	0.5	1 OR 8	1 OR 4	1 OR 3 OR 8	1 MAX		60
RADIO CHANNELS	3	31	31	12	31	31	31	31	31	31	3	1
WEIGHT (LB)	21	21	19	39	46	46	29	29	22	41	29	22
SPEED ALTITUDE MAX LAUNCH	B	B	E	D	B	B	C	E	PARA E ROTO B	* BMOD	E	B
PURPOSE	BT	LOFAR	LOFAR	RO	CASS	CASS	DIFAR	DIFAR	LOFAR	DICASS	ATAC	SAR
POWER (WATTS)	1/4	1	1	1/4	1/4	1/4	1	1	1	1/4	1	1

Sonobuoy Notes: 1. Weights shown above with plastic SLCs. *See NAVAIR 28-SSQ-500

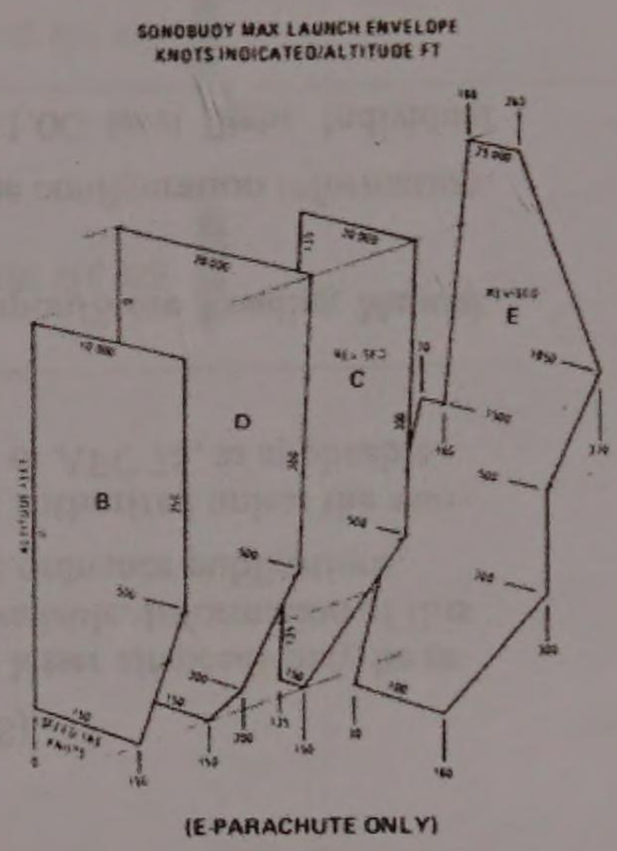
SMOKE MARKER		
TYPE	LIFE (MINUTES)	WEIGHT (LB)
MK-58	45 TO 55	12.75
MK-25	10 TO 20	3.6

TYPE	*WEIGHT (LB)*
PLASTIC SLC	2
METAL SLC	4.5
CAD JAU-1/B	2.5

SOUND UNDERWATER SIGNAL (SUS)					
TYPE	SIZE INCHES	WEIGHT (LB)	FIRING DEPTH/FT	SINKING RATE FT/SEC (TERM V.)	PURPOSE
MK-64	D 3 X 15	6.8	60/800	22.8	Tactical and Practice
MK-84		6.0	WATER ENTRY TO 4 SECS	16.8	

CAUTION

Recommend no parachute sonobuoys be launched from the free fall chute above 250 KIAS. Above 250 KIAS, random buoy fuselage strikes are possible.



(E-PARACHUTE ONLY)

NAVAIR developed buoys may be used with fleet P-3 aircraft for special exercises when they conform to design characteristics for "A" size (4-7/8 X 36) buoy.

Figure 1-58. P-3 Internal Stores (Sheet 2 of 3)

P-3 INTERNAL STORES (Cont)

KILL STORES

Notes

1. LBA – Maximum airspeed versus altitude without external stores (405 KIAS).
2. Airspeeds are maximum for satisfactory separation. Varying with altitude, lesser airspeeds may be required to allow weapon to slow to water entry airspeed within time of fall available. Information of this nature, plus fuze arming and blast-safe altitudes are contained in appropriate ordnance publications.
3. Loading of weapons on MAU-38/A, BRU-12, and Aero 65 type racks is not authorized unless the associated safety pin mechanism has been modified in accordance with AAC 399 or AFC 75, as applicable.
4. All bomb bay weapons should be released in level flight, if possible.
5. For information concerning the loading of stores, refer to Airborne Weapon/Store Loading Manual, NAVAIR 01-75PA-75, as applicable to model type.
6. Refer to NAVSEA OD6678, Rev. 10, July 77 (or a later revision) for all mine configuration information.
7. Any internal store may be safely jettisoned between 180-330 knots in +1.0G level flight. Individual stores may be jettisoned to their particular normal release limits.

SEARCH STORES

WARNING

Sonobuoys which contain a lithium battery are potentially hazardous. Unauthorized handling or tampering with the lithium power supply can result in extreme battery temperatures, venting of toxic gases, explosions, and fire. Refer to NAVAIR 28-SSQ-500-1.

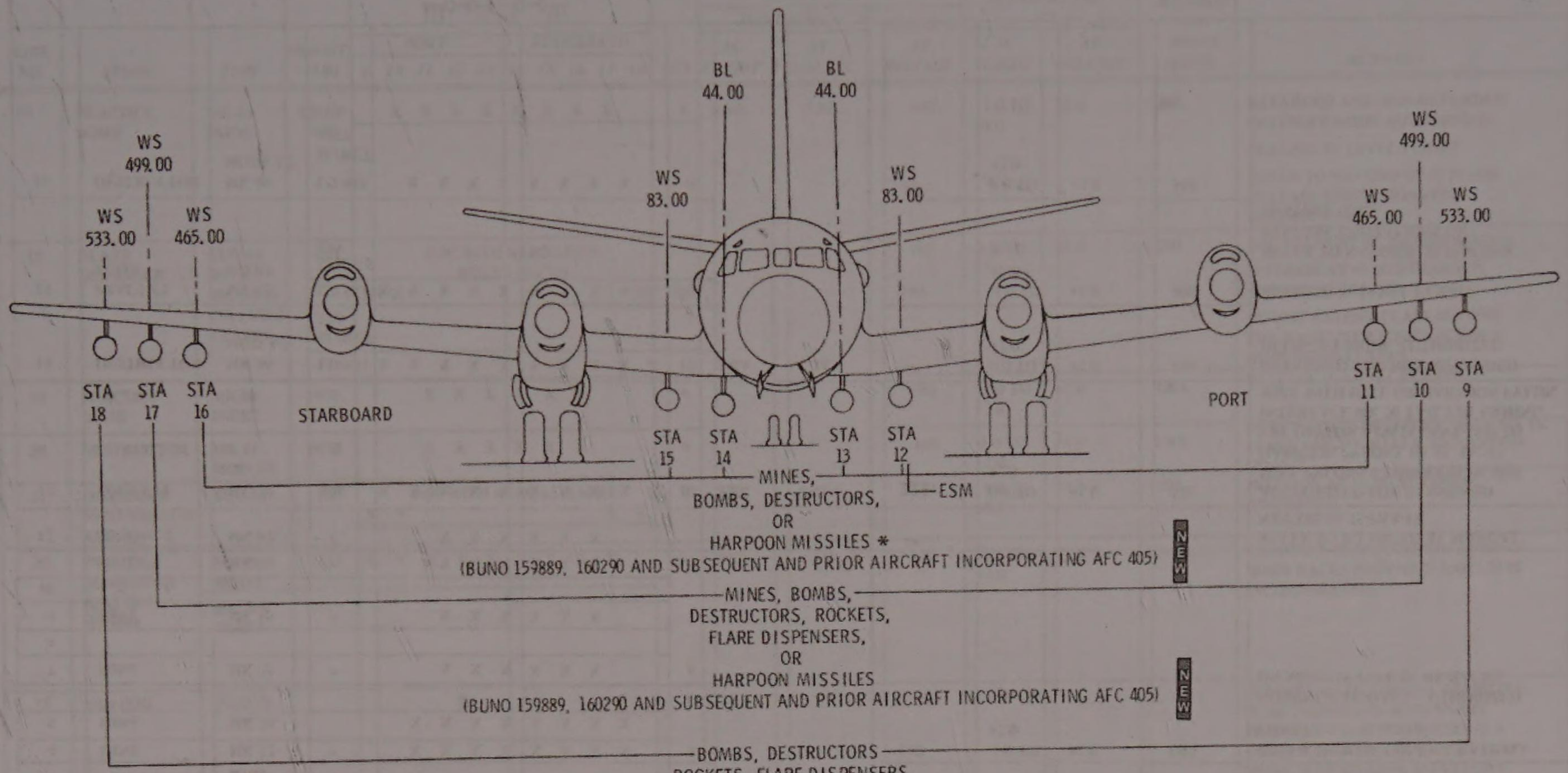
Notes

1. Do not attempt to launch MK-61/64 explosive SUS from CAD fired pressurized external SLCs.
2. SUS may be launched through the free fall chute.
3. ONLY MK-84 can be launched from SLC using foam spacers.
4. Parachute flares are not to be carried internally.
5. When search stores are launched from free fall chutes use fiberglass liners.
6. MK-58 smokes are to be launched from internal PSLTs only.
7. Use foam spacers in SLCs with smokes or hand launch from free fall chute.
8. Maximum release speed for smokes is 350 KIAS.

Figure 1-58. P-3 Internal Stores (Sheet 3 of 3)

WING WEAPON STATIONS

P-3C



NOTE

1 STATION 12 MAY BE USED AS A NORMAL WEAPON STATION IF ESM IS NOT INSTALLED

2 LIMITATIONS WITH ESM POD ARE COMPLETELY SAME AS BASIC AIRCRAFT; WHICH IMPLIES POD IS COMPLETELY EQUIPPED. IN THE EVENT THAT AS-2563/ALQ-78 ANTENNA IS REMOVED FROM ESM POD WITHOUT A DUMMY ANTENNA WEIGHT REPLACEMENT, MAXIMUM SPEED IS RESTRICTED TO 325 KIAS/0.5 IMN AT SEA LEVEL (REDUCE AIRSPEED 25 KNOTS FOR EACH 5000 FEET OF ALTITUDE)

* NOT CARRIED ON STATIONS 12 AND 15

PAC-11C6I0094

Figure 1-59. Wing Weapon Stations

P-3 EXTERNAL STORES

LINE NO.	STORE	TYPE	WEIGHT (LB)	WING STATIONS PORT 9	10	11	12	13	STARBOARD 14	15	16	17	18	QTY	AIRSPEED (KIAS) MAXIMUM IN FLIGHT	MAXIMUM AT RELEASE	MINIMUM AT RELEASE	ACCELERATION (G) IN FLIGHT	AT RELEASE	MAX JETTISON AIR SPEED (KIAS)	REMARKS
1	(4) 5-inch FFAR POD	LAU-10 series	593	X	X							X	X	16 RDS	LBA	LBA	140	-1.0 TO +3.0	+1.0	200 (+1.0G) FULL, PARTIAL, OR EMPTY PODS	STATIONS 9 AND 18 REQUIRE SCARFED FUEL VENT FLAME ARRESTORS INSTALLED.
2	(7) 2.75-inch FFAR POD	LAU-68 series	218	X	X							X	X	28 RDS							
3	(19) 2.75-inch FFAR POD	LAU-61, LAU-69 series	683 (M229)	X	X							X	X	76 RDS							
4	MINE	MK 52	*		X	X	X	X	X	X	X	X		8			180	-1.0 TO +2.0	+1.0	LBA	REFER TO MINE CONFIGURATION CHART. NO MINE CARRIAGE AUTHORIZED ON AERO 15 TYPE BOMB RACKS.
5	MINE	MK 36			X	X	X	X	X	X	X	X									
6																					
7	MINE	MK 25	*			X	X	X	X	X	X			6							
8																					
9	MINE	MK 55	*			X	X	X	X	X	X										
10																					
11	MINE	MK 56	*			X	X	X	X	X	X										
12	MINE	MK 60	*			X	X	X	X	X	X						**				REFER TO P-3 TACTICAL MANUAL NAVAIR 01-75-PAA-1T
13	ROCKEYE	MK 20	496	X	X	X	X	X	X	X	X	X	X	10	LBA	340	225	0.0 TO +2.0	+1.0	340	AUTHORIZED FOR STANDARD MINE PYLONS 9 THROUGH 18 AND HARPOON PYLONS 10, 11, 16, 17. USE CAPTOR 8 INCH LANYARD TO INTERFACE MK 20 TAIL FIN ARMING WIRE WITH MINE OR HARPOON PYLON
14	DESTRUCTOR	MK 36 MOD 3-7	LD 531 SE/RET 572	X	X	X	X	X	X	X	X	X	X	10	LBA	LBA	**	0.0 TO +2.0	+1.0	360	RETARDED AND NON-RETARDED DELIVERY MODE AUTHORIZED.
15	PRACTICE BOMB	MK 82 INERT	LD 531 SE/RET 572	X	X	X	X	X	X	X	X	X	X	10			140	-1.0 TO +3.0	+1.0	400	RELEASE IN LEVEL FLIGHT. REFER TO NAVORD OP-3529 FOR RELEASE LIMITATIONS ON DESTRUCTORS.
16	DESTRUCTOR	MK 40 MODS 3-7	LD 985 SE/RET 1057		X	X	X	X	X	X	X	X		8			**	0.0 TO +2.0	+1.0	360	

*See Mine Chart.
**See remarks.

NEW

Figure 1-60. P-3 External Stores (Sheet 1 of 3)

P-3 EXTERNAL STORES (Cont)

LINE NO.	STORE	TYPE	WEIGHT (LB)	WING STATIONS PORT 9 10 11 12 13	WING STATIONS STARBOARD 14 15 16 17 18	QTY	AIRSPEED (KIAS) MAXIMUM IN FLIGHT	AIRSPEED (KIAS) MAXIMUM AT RELEASE	AIRSPEED (KIAS) MINIMUM AT RELEASE	ACCELERATION (G) IN FLIGHT	ACCELERATION (G) AT RELEASE	MAX JETTISON AIR-SPEED (KIAS)	REMARKS
17	PRACTICE BOMB	MK 83 INERT	LD GP 985	X X X X	X X X X	8	LBA	LBA	140	1.0 TO +3.0	+1.0	400	RETARDED AND NON-RETARDED DELIVERY MODE AUTHORIZED. RELEASE IN LEVEL FLIGHT. REFER TO NAVORD OP-3529 FOR RELEASE LIMITATIONS ON DESTRUCTORS.
18	FLARE DISPENSER	SUU-44 WITH MK 24/45 OR LUU-2 FLARES	350	P-3C WITH AERO 65 OR BRU-15 RACKS X X	X X	32			165	-1.0 TO +3.0	+1.0	200	AAC 570 MUST BE INCORPORATED. JETTISON AT +1.0G STRAIGHT AND LEVEL FLIGHT. DO NOT EXTEND FLAPS BEYOND THE MANEUVER POSITION WHEN DISPENSING FLARES.
19	PRACTICE BOMB	MK 84 INERT	1970	X X X	X X X	6			180	-1.0 TO +2.0	+1.0	LBA	RELEASE IN LEVEL FLIGHT.
20	DESTRUCTOR	MK 41 MOD 3-7	1970	X X X	X X X	6			180	-1.0 TO +2.0	+1.0	LBA	UNRETARDED DELIVERY. RELEASE IN LEVEL FLIGHT. REFER TO NAVORD OP-3529.
21	DISPENSER WITH WMU-1/B AND WMU-2	SUU-53	150	P-3C WITH AERO 65 RACKS X X	X X	4	LBA	LBA	150	1.0 TO +3.0	+1.0	200	JETTISON AT +1.0G STRAIGHT AND LEVEL.
22	PRACTICE BOMB WITH A/A37B-3 (PMBR)	MK 76 MOD 5	237	X X X X X	X X X X X	60	385	385	160	-1.0 TO +3.0	+1.0	385	CARRIAGE PERMITTED ON AERO 65 BOMB RACKS PROVIDED AAC 570 IS INCORPORATED.
		MK 106 MOD 4	117										
23	ESM POD	ALQ-78		X		1	LBA			LBA			NO RELEASE/JETTISON CAPABILITY. IF AS-2563/ALQ-78 ANTENNA IS REMOVED FROM POD WITHOUT A DUMMY ANTENNA WEIGHT REPLACEMENT, MAX SPEED IS 325 KIAS/0.5 IMN AT SEA LEVEL (REDUCE AIRSPEED 25 KIAS FOR EACH 5000 FT OF ALTITUDE)
24	HARPOON	AGM-84	1158	BUNO 159889, 160290 AND UP AND PRIOR AIRCRAFT INCORPORATING AFC 405 X X X	X X X	6	350	350	200	0.0 TO +3.0	+1.0	350	REFER TO OP 3594 FOR INFORMATION.

Figure 1-60. P-3 External Stores (Sheet 2 of 3)

P-3 EXTERNAL STORES (Cont)

KILL STORES

Notes

1. LBA – Maximum airspeed versus altitude without external stores (405 KIAS).
2. Release in straight and level flight.
3. Wing store loading should be symmetrical.
   Exception:
   P-3C, station 15 when ESM is carried on station 12.
4. Only those stores shown in this table may be carried on wing stations.
5. For information concerning the wing stores system, refer to Mission Systems, Section VIII, as applicable.
6. For information concerning the loading of weapons/stores, refer to Airborne Weapon/Store Loading Manual, NAVAIR 01-75PA-75.
7. NEW Any external store may be safely jettisoned between 140 - 200 knots in +1.0G level flight. Individual stores may be jettisoned to their particular jettison limits.

Figure 1-60. P-3 External Stores (Sheet 3 of 3)

P-3C AUTHORIZED MINE CONFIGURATION CHART

MINE	*TYPE*	*OPERATIONAL ASSEMBLIES (OA)*	*MAXIMUM WEIGHT (LB)*	*REMARKS*
MK-25	SERVICE	29, 30	1997	29 HAS MK-34 PARA PACK. 30 HAS MK-26 PARA PACK. NO NOSE FAIRING
MK-25	LAYING DUMMY	29K, 30K	1997	29 HAS MK-34 PARA PACK. 30 HAS MK-26 PARA PACK. NO NOSE FAIRING
MK-36	LAYING DUMMY	29K, 30K	1145	29 HAS MK-37 PARA PACK. 30 HAS MK-27 PARA PACK.
MK-52	SERVICE	4, 5, 9, 10, 11, 12, 13, 14	1250	5, 10, 12, 14 CONTAIN MK-19 HIGH SPEED FAIRING. ALL OA'S HAVE MK-35 PARA PACK.
MK-52	LAYING DUMMY	2K, 3K, 4K, 5K	1250	5K CONTAINS MK-19 HIGH SPEED FAIRING. 2K HAS MK-20 PARA PACK. 3K AND 4K CONTAIN MK-35 PARA PACK.
MK-52	ACTUATION DUMMY	02B, 03B	1250	2B HAS MK-20 PARA PACK. 3B HAS MK-35 PARA PACK.
MK-55	SERVICE	3, 4, 5, 6, 7, 8, 9, 10, 11, 12	2197	4, 6, 8, 10, 12 HAVE MK-20 HIGH SPEED FAIRING. ALL OA'S HAVE MK-36 PARA PACK.
MK-55	LAYING DUMMY	2K, 3K, 4K	2197	2K HAS MK-24 PARA PACK. 3K AND 4K HAVE MK-36 PARA PACK. 4K HAS MK-20 HIGH SPEED FAIRING.
MK-55	ACTUATION DUMMY	2B, 3B	2197	2B HAS MK-24 PARA PACK. 3B HAS MK-36 PARA PACK.
MK-56	SERVICE	5, 6, 9, 10, 11, 12	2147	6, 10, 12 HAVE MK-21 HIGH SPEED FAIRING. ALL OA'S HAVE MK-28-1 PARA PACK.
MK-56	LAYING DUMMY	5K, 6K	2147	6K HAS MK-21 HIGH SPEED FAIRING. ALL OA'S HAVE MK-28-1 PARA PACK.
MK-60	CAPTOR		2370	REFER TO OD 6678 FOR AUTHORIZATION OA.

Figure 1-61. P-3C Authorized Mine Configuration Chart

SECTION II—INDOCTRINATION

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INTRODUCTION.

A continuing training program shall be established which will ensure thorough training and a high degree of readiness for all flight personnel.

The following syllabus outline is intended to serve as a guide to be utitized by individual squadron Air Crew Members.

GROUND TRAINING.

A. NATOPS (GENERAL).

1. NATOPS program.
2. NATOPS manual, format and usage.

B. AIRCRAFT (GENERAL).

1. Electrical System.
2. Hydraulic System.
3. APU.
4. Air Conditioning and Pressurization.
5. Fuel System.
6. Emergency Systems and Equipment.
7. Ordnance.
8. Armament Systems.
9. Normal and Emergency Operating Procedures.
10. Servicing.

C. ELECTRONIC SYSTEMS (GENERAL).

1. Search Stores.
2. Bathythermograph.
3. Magnetic Anomaly.
4. Search Radar.
5. Photographic.
6. Communication.
7. Navigation.
8. IFF.
9. Intercommunication.
10. Navigation Aids.
11. Altimeters.
12. DIFAR and Associated Equipment.
13. Data Link.
14. ESM.
15. Computer and Data Handling.

D. TACCO SYSTEMS.

1. Digital Data Computer and Interfaces.
2. Tactical Data Display (ASA-70).
   a. Multipurpose Data Display.
   b. ASA-70 Tray and Keyboard.
   c. Auxiliary Readout Display.
3. Power Control Panel (A324).
4. Display Test/Control Panel.
5. ICS Master Control Panel (TACCO Station).
6. Armament Stores Jettison.
7. Bomb Bay Rack Lock Control Panel.
8. Manual Armament Select Panel.
9. Armament/Ordnance Test Panel.
10. Torpedo Presetter Panel.

11. Modes of Operation/Armament System.
12. Aircraft Special Weapons Monitor and Control System.
13. AMAC Monitor Control Panel.
14. Special Weapons Operating Procedures.
15. Systems Test.
16. Operational Program.

E. NAV/COMM SYSTEMS.

1. HF Radio.
2. UHF Radio.
3. VHF Radio.
4. Horizontal Situation Indicator.
5. Inertial Navigation.
6. Bathythermograph Recorder.
7. True Air Speed.
8. Central Repeater.
9. Navigation Simulator.
10. Data Link.
11. AGC-6 Teletype.
12. DVARS.
13. ICS Master Control Panel.
14. UHF-1 Voice Selector Panel.
15. A345 Communications Selector Panel.
16. A346 Communications Switching Matrix.
17. Digital Data Computer and Interfaces.
18. Universal Keysets (ASA-70 Group).
19. Auxiliary Readout Display (IP-919/ASA-70).
20. ICS.
21. Systems Test.
22. Operations Program.
    a. Navigation.
    b. Communications.
*23. VHF Navigation System VIR-31A.
24. C-10903/A Controller Display Generator (CDG).

F. SENSOR STATIONS 1 and 2 SYSTEMS.

1. ARR-72 Receiver.
2. AQA-7.
3. AQH-4.
4. TD-900/AS.
5. ASSG.
6. Universal Keyset.
7. Logic Unit 1.
8. System Test.
9. Operational Program.
10. Intercommunication.
11. UYQ-8 SETAD.

*Aircraft BUNO 161122, 161132 and subsequent

12. ASA-76 CASS.
13. CV-3678/A Signal Data Processor Verifier (SPV).

G. SENSOR STATION 3 SYSTEMS.

1. Sensor Data Display.
2. Search Radar (APS-115).
3. Radar Scan Converter.
4. APX-76 IFF Interrogator Set.
5. Magnetic Anomaly Detecting.
6. ASA-64 Submarine Anomaly Detector and ASA-71 Selector Control.
7. ASA-65 Nine Term MAD Compensator.
8. Intercommunication.
9. Electronic Countermeasures.
10. System Test.
11. Operational Program.
12. Tray Functions.

H. ORDNANCEMAN SYSTEMS.

1. Armament.
    a. Bombs.
    b. Depth Bombs.
    c. Mines.
    d. Torpedoes.
    e. Missiles.
    f. Rockets.
    g. Practice Bombs.
    h. Special Weapons.

2. Armament Systems.
    a. Bomb Bay.
        (1) Racks.
        (2) Pylons.
        (3) Safety Pins.
        (4) On-Line Operations.
        (5) Off-Line Operations.
        (6) Control.
        (7) Interconnection Boxes.
        (8) Safety Precautions.

    b. Wings.
        (1) Racks.
        (2) Pylons.
        (3) Safety Pins.
        (4) On-Line Operations.
        (5) Off-Line Operations.
        (6) Control Boxes.
        (7) Interconnection Boxes.
        (8) Safety Precautions.

3. Ordnance System Search Stores.
   a. SLT and PSLT.
      (1) Loading.
      (2) Unloading.
   b. CADs.
   c. On-Line Operations.
   d. Off-Line Operations.
   e. Control Boxes.
   f. Interconnection Boxes.
   g. Safety Precautions.
4. Cameras and Illuminating Stores.
   a. Film Supply.
   b. Forward and Aft Camera Checks.
   c. Illuminating Stores.
   d. Observance of Safety Precautions.
5. Systems Test.
6. Operational Program.
7. Intercommunications System.

I. FLIGHT TECHNICIAN SYSTEMS.

1. Systems.
   a. Digital Data Computer.
   b. Data Processing System.
   *c. Magnetic Tape Transports.
   d. SD/DS Signal Data Converter.
2. Initialization and Software.
   a. Magnetic Tape Handling.
   b. Equipment Initialization.
   c. System Test Program.
   d. Operational Program.
   **e. Digital Magnetic Tape Units

FLIGHT TRAINING (GENERAL).

A. PREFLIGHT.

1. Flight Planning.
2. Equipment Preflight.
3. Safety and Survival Equipment.
   a. Personal Equipment and Knowledge.

B. PRETAKEOFF.

1. Observer Duties.
2. Knowledge of Battle/Flight Conditions.
3. Cabin/Station Properly Rigged for Takeoff.

C. AFTER TAKEOFF.

1. In-flight Equipment Checks.

D. IN FLIGHT.

1. Equipment Utilization.
2. In-flight Troubleshooting.
3. Emergencies:
   a. Fire of Unkown Origin, Ditching, and Bail-out Procedures.
   b. Emergency Equipment and Knowledge.
4. In-flight Maintenance Documentation.

E. LANDING/POSTFLIGHT.

1. Equipment Secure (as applicable).
2. Preparation for Landing.
3. Aircraft Postflight.
4. Discrepancies Logged.

The flight training syllabus shall also include lessons to qualify individual crewmembers to perform assigned tasks listed in Sections III and X of this manual.

FLIGHT CREW REQUIREMENTS.

A. MINIMUM CREW.

Four crewmembers, which shall include the pilot, copilot, flight engineer and one additional crewmember, will make up the minimum crew for operation of the P-3C aircraft.

B. TACTICAL CREW COMPLEMENT.

Tactical aircrews should, for effectively carrying out an ASW mission, be composed of the following personnel:

Pilot
Copilot
Tactical Coordinator
Navigation/Communications Officer
In-flight Technician
Flight Engineer
Second Mechanic
Sensor Station 1 Operator
Sensor Station 2 Operator
Sensor Station 3 Operator
Ordnanceman

Flight duties of crewmembers are described in Section III.

*Aircraft BUNO 156507 through 161131, except 159889
**Aircraft BUNO 159889, 161132 and subsequent

PERSONAL FLYING EQUIPMENT REQUIREMENTS.

The latest available flight safety and survival equipment, as authorized by the Aviation Crew Systems Manual, Volume 7 (Aircrew Personal Protective Equipment) NAVAIR 13-1-6.7, shall be used by crewmen and passengers for flight with OPNAVINST 3710.7 (series).

QUALIFICATION, CURRENCY, AND REQUALIFICATION REQUIREMENTS.

A. QUALIFICATION REQUIREMENTS.

Initial qualification and requalification shall be in accordance with OPNAVINST 3510.9 (series), for Naval Flight Officers and Aircrewmen.

Minimum Mission Commander qualification requirements shall be as follows:

a. Completion of all requirements for PPC or PPTC.
b. Current instrument rating for all Naval Aviators and instrument qualification for Naval Flight Officers.
c. Designation in writing by the squadron Commanding Officer.

B. CURRENCY REQUIREMENTS.

Currency requirements for Naval Flight Officers and Aircrewmen shall be in accordance with OPNAVINST 3710.7 (series).

CREW REST REQUIREMENTS.

The following crewmember rest requirements are considered to be the minimum criteria which will provide an acceptable level of physical and mental performance during flight operations:

a. Flight personnel should not be scheduled for continuous alert and/or flight duty (required awake) in excess of 18 hours. Maintenance and operational delays prior to takeoff should be included in this computation.

b. Flights of less than 6 cumulative hours duration originating during normal working hours require no specified prelaunch crew rest period.

c. All other flights require 10 hours crew rest prior to scheduled preflight time. A minimum of 15 hours of crew rest is required between postflight and preflight of all flights scheduled in excess of 6 hours duration.

Commanding officers shall operate within these requirements and ensure that proper utilization by crewmembers is made of the authorized crew rest periods. Little or no physiological benefit will be realized if personnel engage in routine liberty or administrative activities during their assigned rest periods.

SECTION III — NORMAL PROCEDURES

PART 1 — NORMAL PROCEDURES (GENERAL)

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INTRODUCTION.

The normal procedures contained in this manual are intended to standardize operations of both training and operational units with P-3C model aircraft. This standardization should provide the ultimate in combat readiness and effectiveness, as well as establish a greater degree of safety for all phases of flight, ground handling, and overwater work.

The information contained herein is intended to clarify, amplify, and standaradize those areas where there is room for variety of interpretation by individual commands. The procedures contained herein cannot possibly cover every conceivable situation, but are intended to govern situations most frequently met. Safety and success of any mission are of paramount importance, with precedence of actions depending upon the existing situation. The flight engineer and tactical coordinator shall ensure that volumes of NAVAIR 01-75PAC-1 and NAVAIR 01-75PAC-1.1, respectively, are aboard the aircraft. If a tactical coordinator is not assigned, individual tactical crewmembers shall ensure that a volume of NAVAIR 01-75PAC-1.1 is aboard.

BRIEFING.

The mission commander (or pilot in command if no mission commander is assigned) is responsible to ensure the crew is briefed and that each man is acquainted with the mission and understands his duties and responsibilities. The briefing must be tailored to meet the needs of the mission and the experience of all embarking personnel. The mission commander must ensure that conditions of flight are understood by noncrew personnel, that all personnel have been assigned a ditching station and individual survival equipment, and that they understand how to use the equipment. Each piece of survival equipment to be removed from the aircraft in the event of ditching must be assigned to an individual on flights with nonstandard personnel loadings. If the flight is to be conducted in a hazardous environment, lookout duties must be assigned.

MISSION PLANNING.

The degree of planning for each mission will vary with the nature of the specific task to be accomplished. Each mission must be analyzed and planned to cover its specific purpose. The following are items that must be considered:

a. Does analysis of the mission indicate special crew training is required to cope with new tactics?

b. The equipment to be utilized must be preflighted to ensure proper operation.

c. Note navigation problems. Determine route, note obstacles, terrain, restricted areas, ADIZ boundaries, controlled airspaces, and the time enroute.

d. Are other forces participating? Check characteristics and recognition features of other units in the area.

e. Communications frequencies, call signs, cryptographic and authentication procedures. Note special signals established.

f. Are special publications, forms, documents, or charts required?

g. Photographic requirements.

h. Restrictions on employment of ordnance.

i. Determine type and quantity of expendable stores to be carried.

j. Determine the fuel load and suitable airfield available during the proposed flight. Prepare a HOWGOZIT for flights scheduled to operate in excess of 1000 nautical miles from the nearest suitable field.

k. Note requirement for special clothing and survival equipment.

l. Flight packet with forms for obtaining services at Navy and other-services bases, including civilian fields.

m. Flight rations.

n. Weight and balance.

o. Radio aids to navigation.

p. Alternate airfields in the vicinity.

q. Terminal approach provisions.

r. Consider time of return. Will arrangements be required to alert, feed, and transport the crew?

s. Note provisions for altitude reservations and assignments.

t. Weather for departure, destination, and alternate(s).

(1) Aerology briefing for departure, enroute, on-station, return destination and alternates.

(2) The weather briefing should include a forecast altimeter setting and a forecast minimum altimeter setting for the on-station area.

(3) All overwater flights of two or more hours in duration shall request a horizontal weather depiction or vertical cross section, whichever is applicable, if such sevice is available.

SCHEDULING.

Refer to OPNAV 3710.7 (series).

WEIGHT AND BALANCE.

Refer to OPNAV 3710.7 (series).

AUXILIARY POWER UNIT PROCEDURES.

INSPECTION.

Prior to starting APU, check that intake and exhaust door areas are clear of personnel and equipment. Inspect exhaust and intake areas for obstructions and foreign objects. Check APU HRD bottle for correct pressure in accordance with placard below pressure gauge.

GROUND OPERATION.

A crewmember or qualified maintenance operator shall be on board the aircraft during ground APU operations, or whenever external power is applied.

CAUTION

- To prevent damage to the equipment caused by overheating, do not operate the integrated avionics system without maintaining the cabin temperature below 27°C.
- Ensure minimum of 1000 pounds of fuel in tank No. 2 and in tank No. 3 to provide adequate hydraulic oil cooling.

NEW NEW

1. NORMAL-SAFE switch–NORMAL.

2. All circuit breakers on APU essential bus circuit breaker panel and on APU portion of ground operation dc bus circuit breaker panel–IN (E).

3. APU arming switch–OFF (in-flight–ARM).

4. APU fire detector–Checked.

5. APU control switch–START, then release to ON. Actuation of this switch causes the following sequence to occur:

a. Intake and exhaust doors open.

b. APU starter is energized.

c. At approximately 10 percent rpm, ignition occurs and fuel flow is initiated.

d. As rpm increases to approximately 35 percent, starter is deenergized.

e. RPM increases to 100 percent.

6. No. 2 fuel boost pump–As required (to maintain rpm within limits).

Auxiliary power is now available on the ground for starting the main engines, air conditioning, bomb bay heating, and ground electrical requirements as needed. In flight, only electrical power is available.

CAUTION

APU Limits
EGT 715°C, maximum peak
710°C, maximum peak (10 seconds)
677°C, maximum continuous
RPM 98 - 102 percent (ground)
106 percent, maximum

NEW NEW NEW

6. Keep transmissions at a minimum.

7. Short and important transmissions should be completed without requiring acknowledgment prior to transmitting the text. Example: "Pilot from TACCO, aircraft 9 o'clock, level, closing."

8. The following ICS selections are recommended prior to takeoff, landing, and during emergencies:

a. Pilot MIC SEL switch–ICS

b. Pilot ICS SEL switch–PA

c. Copilot MIC SEL switch–appropriate selection.

d. All other crewmembers ICS SEL switches–ALL.

SURVIVAL EQUIPMENT, PREFLIGHT.

1. Check survival vest for minimum mandatory survival gear.

a. MK-79 Pencil Flare Gun and Flares

b. Strobe light

c. Whistle

d. Shroud cutter

e. Survival knife

f. Pen light

g. Signal mirror

h. MK-13 Day/Night Distress Flares

2. Check flotation device for punctures and tears. Check LPP-1 or MK-II for presence of unused CO_2 cartridges.

3. Preflight parachute.

a. Check harness for tears, cuts and moisture.

b. Check parachute for fit. Parachute shall be fitted over the survival vest and/or inflatable life preserver.

c. Stow parachute in holder.

4. Check oxygen bottle, check smoke mask for fit and that there are no exposed wires.

OXYGEN SYSTEM OPERATION.

1. Regulator supply lever–ON.

WARNING

Prior to any crewmember utilizing oxygen the flight station shall be notified to put the smoking lamp out.

2. Regulator diluter lever–100% OXYGEN.

3. Test oxygen system by operating the test switch to TEST MASK; there should be a continuous flow of oxygen from the mask.

4. Put on smoke mask. Fully engage the mating portions of the disconnect coupling. Attach alligator clip to parachute harness or clothing sufficiently high to permit free head movement.

5. Check mask fit by squeezing mask tube and inhaling lightly; if there is no leakage, the mask will adhere tightly to face and definite resistance to inhalation will be encountered.

6. Frequently check supply pressure gages and blinker flow indication during flight.

WARNING

Regardless of altitude, whenever excessive carbon monoxide or other noxious or irritating gases are present or suspected, use 100% OXYGEN until the condition is improved.

7. If symptoms of hypoxia occur or the regulator becomes inoperative, immediately move the regulator lever to 100% OXYGEN and descend to an altitude below 10,000 feet.

8. When securing the system, leave the switches in the following positions:

a. Oxygen regulator emergency pressure lever–NORMAL.

b. Oxygen regulator diluter lever–100% OXYGEN.

c. Oxygen regulator supply lever–OFF.

Note

If using a portable walkaround oxygen bottle, ensure the supply valve is closed and the residual oxygen has been bled off prior to stowing the bottle.

SEARCH AND RESCUE.

P-3 equipped units may be directed to assist in search and rescue operations, primarily in the search phase. The P-3 lends itself to this task with fast enroute speeds and good on-station endurance capability. Effective search plans and techniques are covered in the Search and Rescue Manual. To assist survivors when located at sea, a SAR drop kit, consisting of two MK-7 liferafts and an emergency equipment container, has been developed for use by P-3 units. These kits should be fabricated in accordance with Aircrew Systems Change No. 92 of Feb. 1967 and changes (see figure 3-1). All P-3 aircrew personnel concerned with the utilization of the SAR kit should be familiar with the SAR kit, deployment preparation, and deployment techniques. The patrol plane commander should designate a dropmaster (normally the TACCO) and two other aircrewmen to perform the drop duties. A thorough briefing should precede the mission covering in detail the techniques, coordination and communications involved.

Figure 3-1. SAR Kit Stowage

DEPLOYMENT OF SAR KIT.

Upon a receipt of a directive requiring an air drop SAR mission, proceed to the location of survivors and determine the direction of the surface wind. Depressurize the aircraft and order preparation for the SAR drop. Coordination between the pilot, dropmaster and crewmembers dropping the SAR kit is critical. The following procedures will ensure successful SAR kit deployment.

Note

The SAR kit should normally be stowed as depicted on figure 3-1.

PILOT PROCEDURES.

1. Upon arrival in the drop area, determine surface wind (approximate direction and velocity). Attempt to ascertain condition of survivors in regard to their ability to help themselves retrieve the SAR kit and board the rafts. Carefully ascertain if there is fuel or oil on the surface of the water in the vicinity of survivors (petroleum is normally visible on the surface of the water). Slicks or streaks of irridescence on the surface may be indications of the presence of flammable fuels. Under conditions of darkness this will be very difficult to determine. If fuels are present or suspected, do not use smoke lights or markers of a type which could ignite fuel. Alternate markers of readily available items would be dye markers, several Mae West lights, or strobe lights attached to an inflated Mae West.

2. Establish an orbit around survivors until dropmaster signifies he is ready for drop run.

WARNING

All flight maneuvers conducted during the SAR drop procedure should be made with utmost consideration for the safety of the drop crew, especially during operations with the main cabin door open.

3. Establish the aircraft at an altitude of 300 feet with an airspeed of 1.2 Vs (flaps up) but not below 130 knots. Maneuver flaps are recommended. Approach the survivors in a crosswind direction and enter the flight path shown in figure 3-2. Remind the crew to suspend ICS communications until after the drop.

SAR DROP-AREA FLIGHT PATH

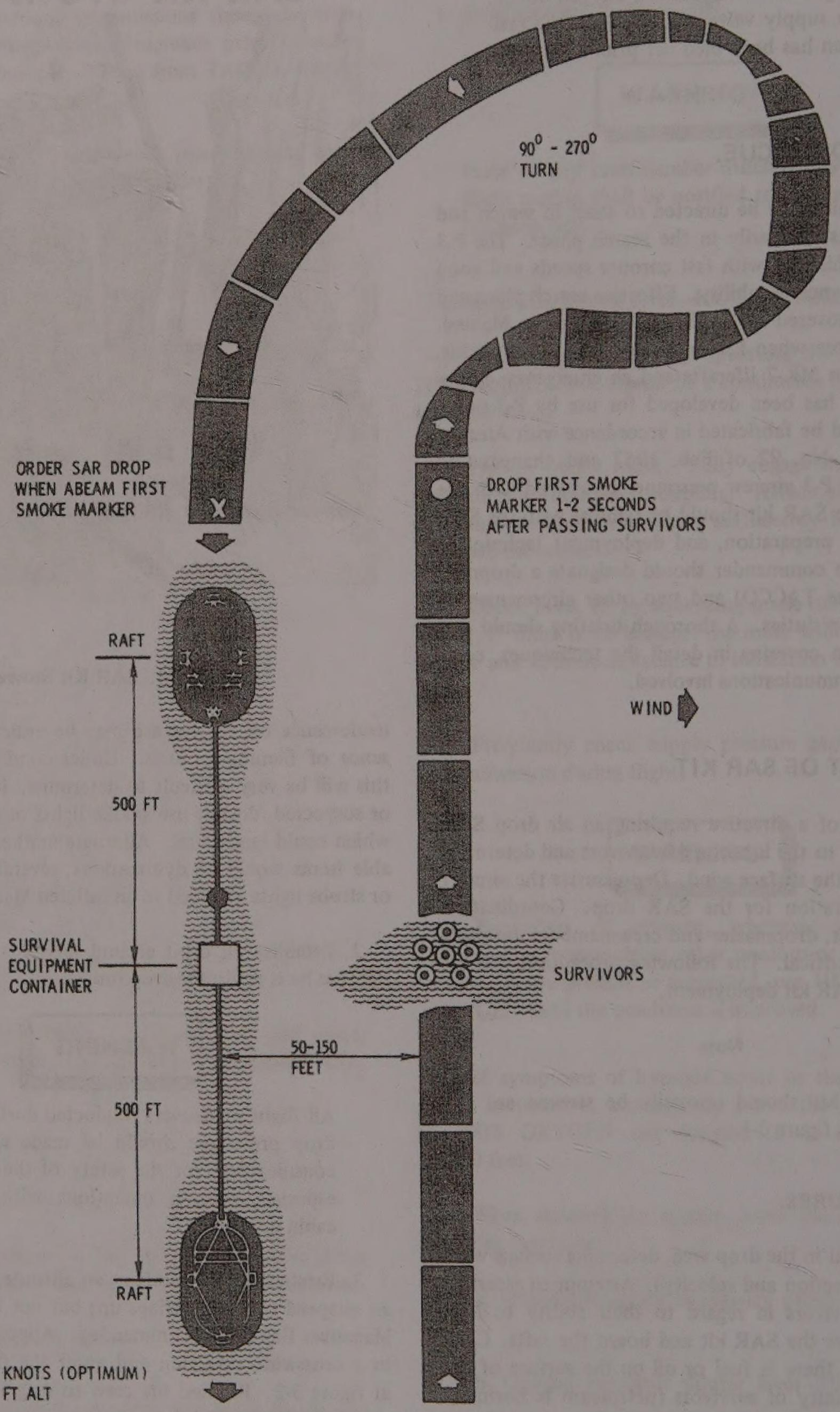


Figure 3-2. SAR Drop-Area Flight Path

CREWMEMBER HARNESS ATTACHMENT (FWD VIEW)

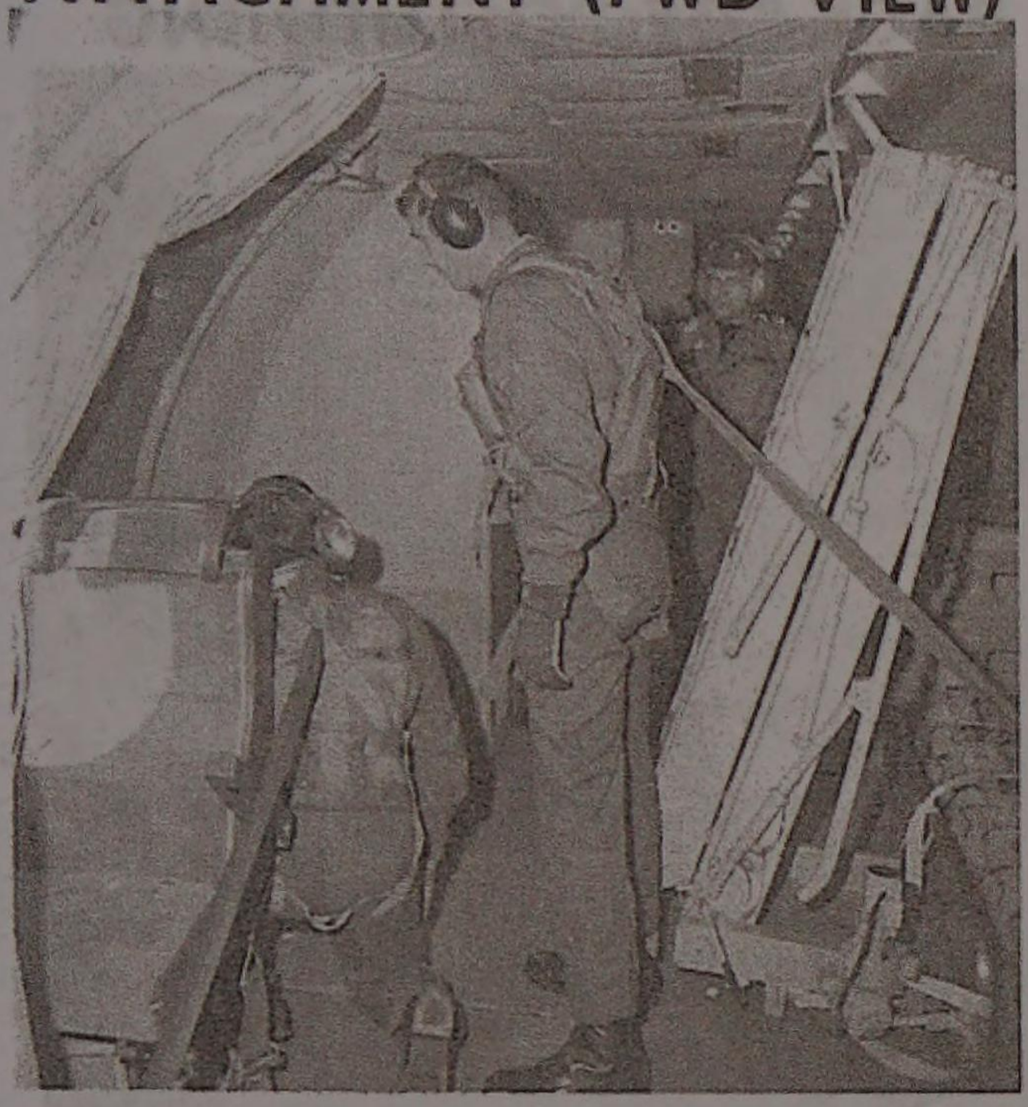


Figure 3-3. Crewmember Harness Attachment (Forward View)

CREWMEMBER HARNESS ATTACHMENT (AFT VIEW)

Figure 3-4. Crewmember Harness Attachment (Aft View)

WARNING

Use of approach/landing flaps will disable RAWS and may result in unacceptable range limitation in the event of flap asymmetry.

4. Make crosswind run directly over the survivors. Order the dropmaster to launch a smoke light or marker 1 to 2 seconds after passing survivors.

5. Execute a 90 to 270 degree turn and align flight path to pass 50 to 150 feet upwind of survivors. Order SAR drop when abeam smoke light or marker.

DROPMASTER AND CREWMEN PROCEDURES.

1. Remove ladder from tracks and secure to rail next to pressure sono chutes and secure the top to the overhead handrail (see figure 3-3).

2. Move both rafts from stowage location to a position beside the port aft observer seat.

3. Move equipment package to a position between the ladder and main cabin door but clear of opening area.

4. The dropmaster and two crewmembers shall don NC-3 parachute harnesses and connect safety lines. Adjust lengths of safety lines to allow movement of crewmen to within 1 foot of door (out of red area). One crewman shall be located in front of the main cabin door; one shall be aft of the door. The forward crewman shall connect his safety line to the cargo deck ring forward of the starboard aft observer seat (see figures 3-3 and 3-4). The aft crewmember's safety line shall be secured to cargo deck rings just aft of rack H2. (See figure 3-5.) The dropmaster safety line shall be connected to the cargo deck ring just aft of the sonobuoy storage bins.

5. Dropmaster maintains ICS communication with pilot using ordnance operator headset and 15-foot headset cord.

6. Dropmaster notifies pilot he is standing by to open main cabin door.

7. The pilot gives command to open main cabin door.

8. Upon command, open and stow main cabin door.

CREWMEMBER SAFETY LINE ATTACHMENT

Figure 3-5. Crewmember Safety Line Attachment

SAR EQUIPMENT PACKAGE POSITIONING

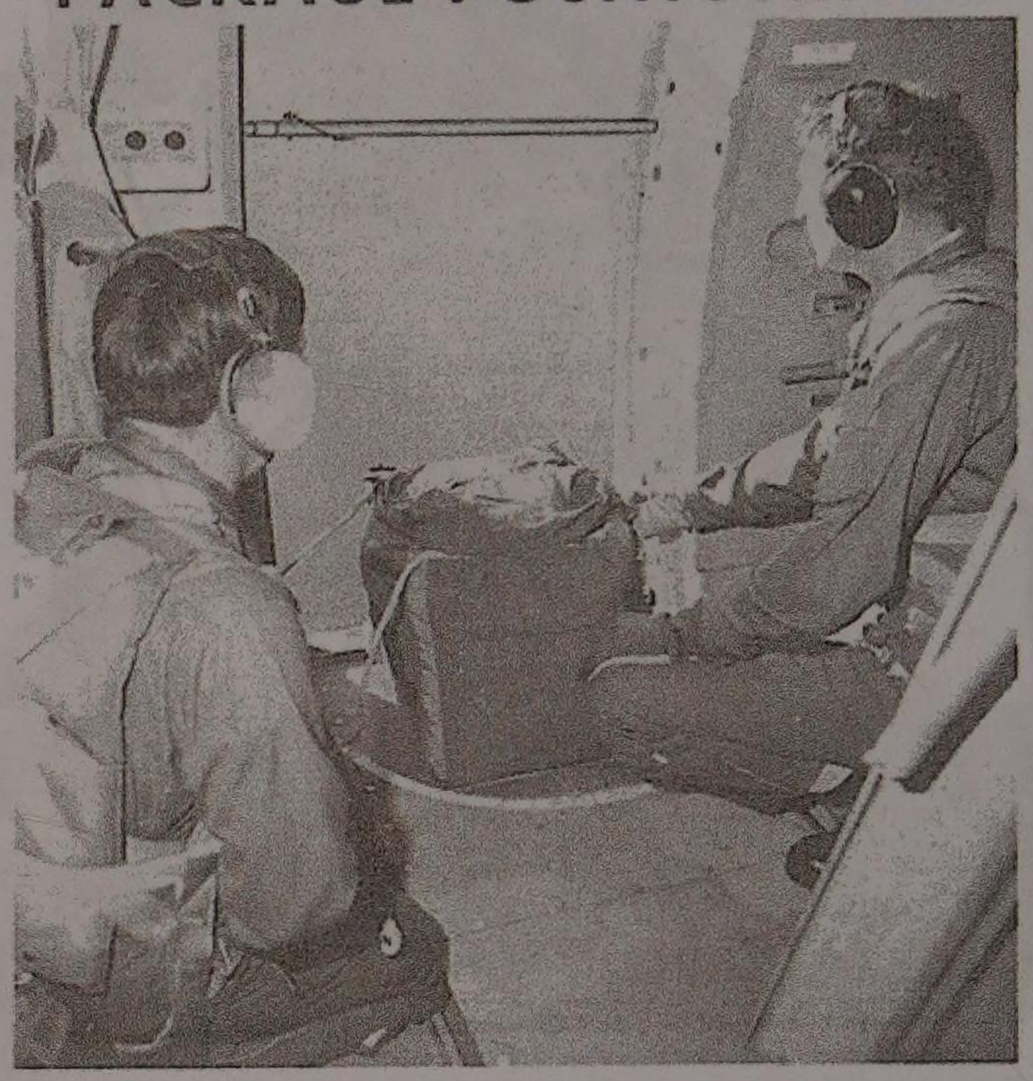


Figure 3-6. SAR Equipment Package Positioning

9. Install SAR bar in main cabin door opening.

10. Crewmen position survival equipment package in front of opening (see figure 3-6) liferaft attachment fittings aft and with line pocket extending approximately 3 inches beyond the door sill. Forward crewman grasps survival equipment package carrying handle to prevent inadvertent loss of package due to turbulence.

11. Aft crewman moves first raft to be launched to a position against the back of port aft observer seat. He then moves second raft (third package) behind and leaning against second package.

12. Aft crewman attaches line from first raft to be launched to line attachment fitting on outboard line of equipment package.

13. Forward crewman attaches 25-foot static line from both rafts to ditching station 20 seat belt D-ring. (See figure 3-7.) Tape static line to deck just aft of doorway to prevent line tangling due to air blast.

14. Aft crewman attaches line from last raft to be launched to line attachment fitting on inboard side of equipment package.

WARNING

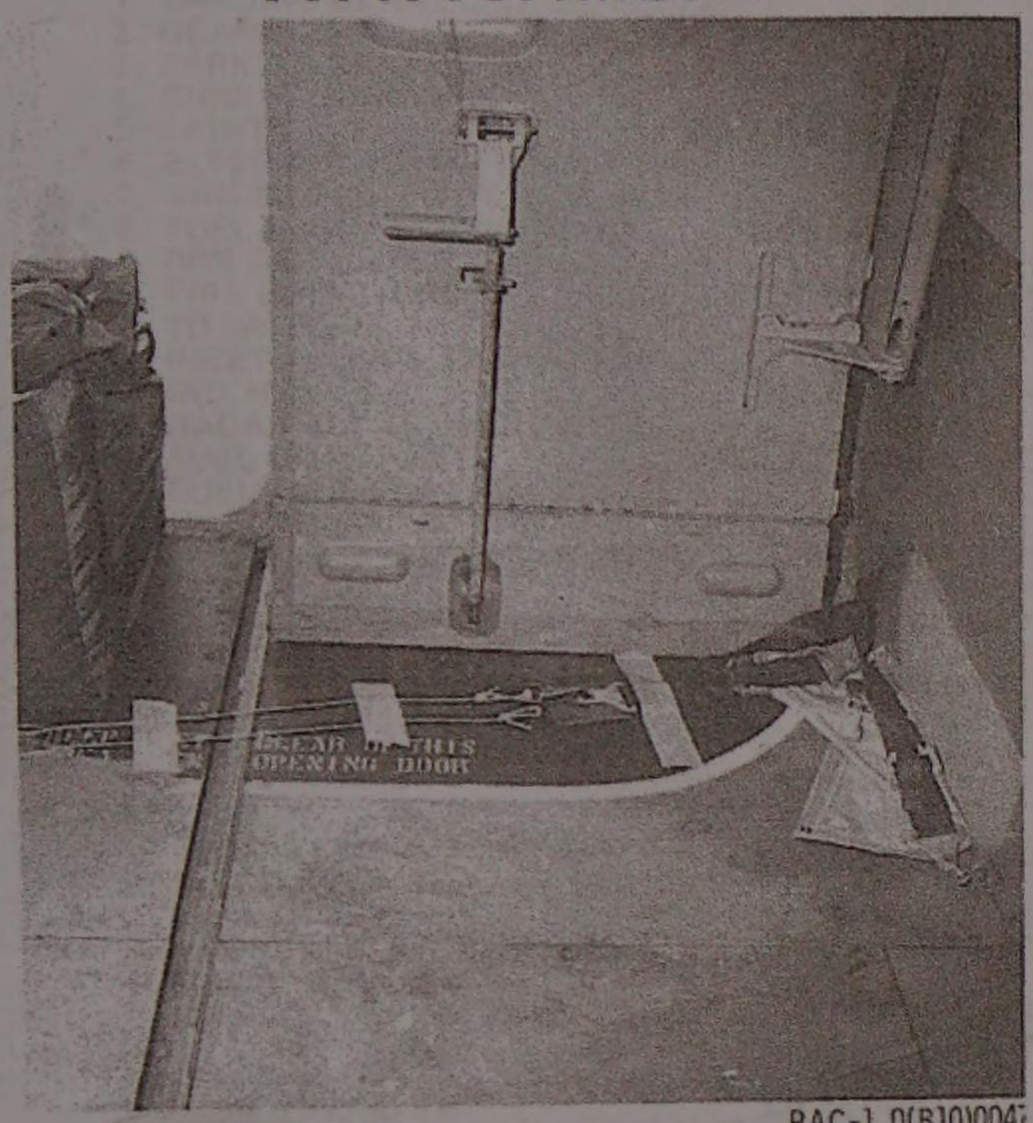
Both crewmen and dropmaster shall inspect all lines and connections for security and safety. Lines that may become entangled or be a hazard to the launching crewmen must be safely positioned prior to drop. Should any part of the SAR kit inadvertently fall out of the opening after lines have been attached, immediately jettison entire kit.

15. After turning inbound to the survivors and at the dropmaster's direction, aft crewman positions first raft to be dropped on top of center package with static line and polyethylene line down. (See figure 3-8.) Both launchers assume launch position (kneeling and behind all packages and lines), balancing first raft with handles provided.

16. Dropmaster visually checks both packages and crewmen to verify crewmen cannot become entangled in any line during drop.

17. Dropmaster reports "Ready to drop" to pilot. (This preparation requires approximately 5 minutes after the

SAR STATIC LINE ATTACHMENT



PAC-1.0(B10)0047

Figure 3-7. SAR Static Line Attachment

DEPLOYMENT OF SAR KIT

A-2898-4

F141-9-1.0-3-14 (5)

Figure 3-8. Deployment of SAR Kit

door is initially opened. Pilot must consider this lead time in planning for the drop-run.)

18. On pilot command, dropmaster hand launches first smoke light or marker.

19. Upon pilot command, dropmaster visually and orally signals crewmen to commence drop of the SAR kit.

Note

Due to noise level caused by air blast around the open door, ICS and PA transmissions from the pilot cannot be heard without a headset.

20. Upon dropmaster signal, crewman pushes first raft out of opening. As the first raft clears the opening, immediately commence pushing equipment package out of the opening by grasping handles of last raft and pushing raft and equipment package toward opening.

21. As equipment package drops clear, dropmaster hand launches smoke light or marker. One to two seconds after equipment package drops, crewmen push last raft out.

Note

If second raft is not properly delayed and leaves the aircraft too early, effective raft spacing will not be achieved and the survivors may not be contained within the drop pattern. Refer to figure 3-9 for desired SAR kit drift after water impact.

22. Crewmen retrieve static lines and close main door.

Note

Ladder should at this time be repositioned in the track.

NORMAL AND EMERGENCY CHECKLIST.

The P-3C normal checklist is shown in figure 3-10. The emergency checklist is shown in figure 3-11.

NEW NEW

SAR RETAINING LINE DRIFT AFTER IMPACT

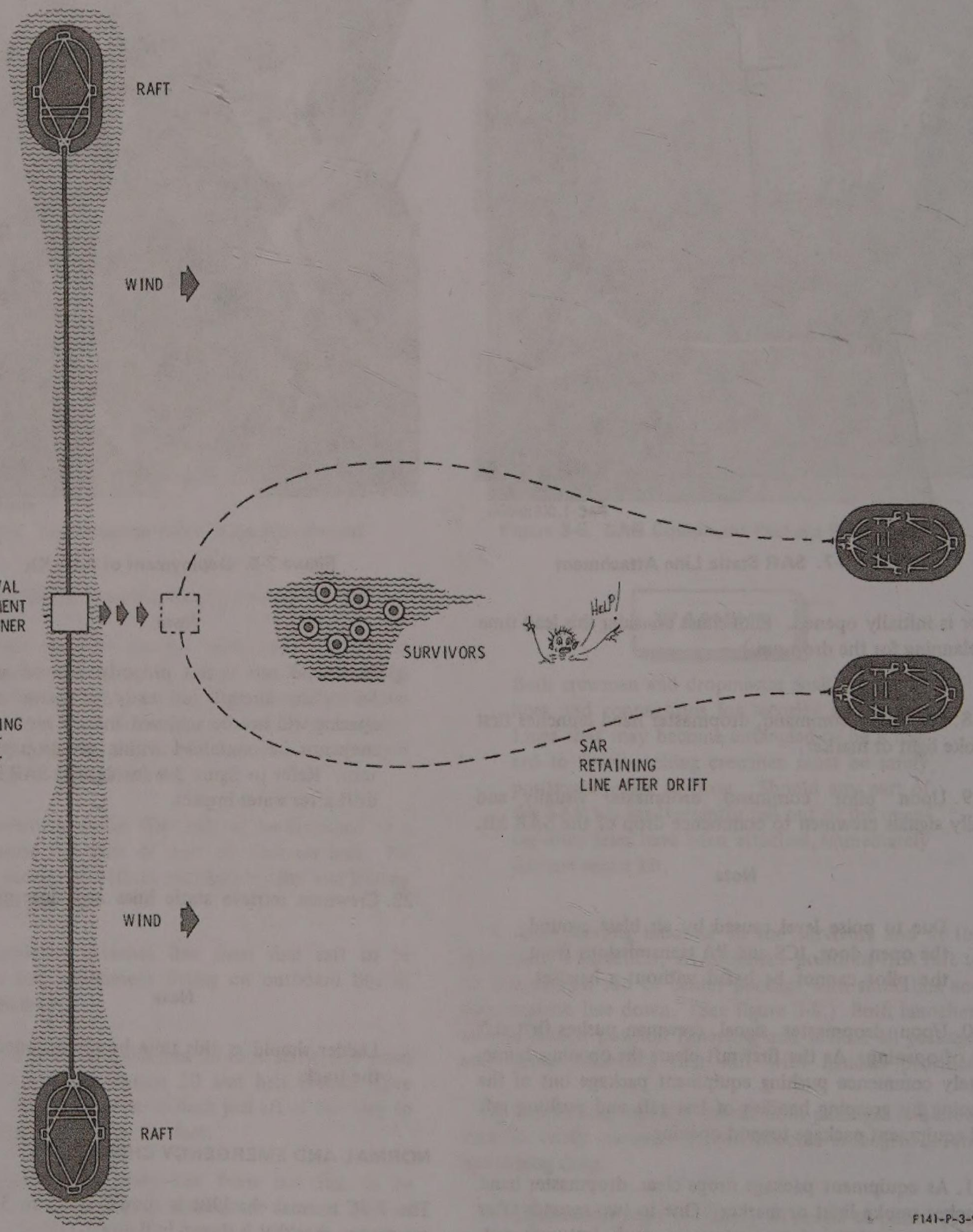


Figure 3-9. SAR Retaining Line Drift After Impact

P-3C NORMAL CHECKLIST

BEFORE START.

1. LANDING GEAR . . . . . DOWN (P)
* 2. GEAR PINS . . . . . AS DESIRED (CP,E)
3. PARKING BRAKES . . . . . SET (P)
4. CIRCUIT BREAKERS . . . . . SET (E)
5. LIGHTS . . . . . CHECKED & SET (P,CP,E)
* 6. BLEED AIR, ICE CONTROL PANEL . . . . . SET (E)
7. WINDSHIELD, PITOT, AOA HEAT . . . . . LOW; ON (E)
* 8. FUEL & IGNITION SWITCHES. . . . . AS REQUIRED (E)
* 9. RPM SWITCHES . . . . . SET (E)
10. FIRE DETECTORS . . . . . CHECKED (E)
11. TD SWITCHES . . . . . CYCLE (E)
12. INERTIAL 1 & 2, STBY ATT IND, HSIs . . . . . CHECKED (P,CP)
13. RADAR ALTIMETERS . . . . . ON (P,CP)
14. FUEL QUANTITY . . . . . POUNDS (E)
* 15. FUEL PANEL . . . . . SET (E)
16. HYDRAULIC PUMP 1A . . . . . ON (E)
17. ARM. PANEL, BOMB BAY DOORS . . OFF, CLOSED (P)
18. FLAPS . . . . . AS DESIRED (CP)
19. CHOCKS . . . . . AS DESIRED (P)
20. GROSS WEIGHT & CG . . . . . (E)
21. TAC CREW CHECKLIST . . . . . COMPLETED (TC)
* 22. ANTI-COLLISION LIGHT . . . . . ON (E)
* 23. DOORS & HATCHES . . . . . AS REQUIRED (E)

AFTER START.

* 1. ENGINE START SELECTOR . . . . . OFF (E)
* 2. BLEED AIR, FUSELAGE SHUTOFF VALVES . . . . . AS REQUIRED (E)
* 3. HYDRAULIC PANEL . . . . . SET (E)
* 4. MAD, DVARS, ESM, IRDS . . . . . AS REQUIRED/ON/STBY/RETRACTED (CABIN)
5. IFF . . . . . STANDBY (CP)
6. FUEL TRANSFER . . . . . AS REQUIRED (E)

TAKEOFF.

1. SET CONDITION V . . . . . (CP)
2. BRAKES . . . . . CHECKED (P)
3. TURN INDICATORS, COMPASSES, ALTIMETERS . . . . . CHECKED (P,CP)
* 4. SYNC SERVOS . . . . . OFF (E)
* 5. FUEL GOV CHECK SWITCHES . . . . . NORMAL (E)
6. AUTOFEATHERING . . . . . AS DESIRED (E)
* 7. TRIM TABS . . . . . SET (P)
* 8. FLAPS . . . . . TAKEOFF (P, CP)
9. FLIGHT CONTROLS . . . . . CHECKED (P)
10. APU, DOORS LIGHT . . . . . OFF, OUT (E)
11. OIL TANK SHUTOFF VALVE CKT BKRS . . . OUT (E)
12. RADIO, HSIs, FDS . . . . . SET (P,CP)
* 13. REPORT CONDITION V . . . . . (CABIN)
* 14. RPM . . . . . NORMAL (E)
* 15. ELECTRICAL PANEL . . . . . CHECKED (E)
* 16. HARNESS . . . . . SET (P,CP,E)
17. ICE CONTROL PANEL . . . . . SET (E)
18. IFF . . . . . SET (CP)
* 19. OIL COOLERS . . . . . SET (E)
* 20. LIGHTS . . . . . AS REQUIRED (E)

CLIMB.

1. LANDING GEAR . . . . . UP (CP)
2. FLAPS . . . . . UP (CP)
3. AUTOFEATHERING . . . . . OFF (E)
4. PRESSURIZATION . . . . . SET (E)
5. GOVERNOR INDEXING . . . . . SET (E)
6. LIGHTS . . . . . AS REQUIRED (E)

LOITER SHUTDOWN.

1. PERFORM NTS CHECK . . . . . (E)
2. SYNC SERVO (AFFECTED ENG) . . . . . OFF (E)
3. NTS/FEATHER VALVE SWITCH . . . . . FEATHER VALVE (E)
4. POWER LEVER . . . . . FLIGHT START (E)
5. PUSH FEATHER BUTTON . . . . . (E)
6. MONITOR PROP & INST FOR COMPLETE SHUTDOWN . . . . . (P,CP,E)
7. CHECK FEATHER BUTTON LIGHT . . . . . OUT (E)
8. FUEL & IGNITION . . . . . OFF (E)
9. BOOST PUMP . . . . . ON (E)

RESTART.

1. AIRSPEED . . . . . 210 KIAS MIN RECOMMENDED (P)
2. FUEL & IGNITION . . . . . OFF (E)
3. SYNC SERVO . . . . . OFF (E)
4. FUEL BOOST PUMP . . . . . ON (E)
5. EMERGENCY SHUTDOWN HANDLE . . . . . IN (E)
6. OIL TANK SHUTOFF VALVE CKT BKR . . . . . OUT (E)
7. POWER LEVER . . . . . FLIGHT START (E)
8. NTS/FEATHER VALVE SWITCH . . . . . FEATHER VALVE (E)
9. FEATHER BUTTON . . . . . IN (E)
10. PRESSURE CUTOUT OVRD . . . . . PUSH & HOLD 10 SEC (E)
11. FEATHER BUTTON . . . . . UNFEATHER AFTER RELEASING OVERRIDE (E)
12. OIL PRESSURE . . . . . RISING (E)
13. FUEL & IGNITION . . . . . ON, (AFTER RPM STABLE) (E)
14. FEATHER BUTTON . . . RELEASE AT LIGHTOFF (E)
15. OIL PRESSURE . . . . . NORMAL (E)
16. OIL COOLER . . . . . SET (E)
17. ELECTRICAL PANEL . . . . . CHECKED (E)
18. SYNC SERVO . . . . . NORMAL (E)
19. NTS/FEATHER VALVE SWITCH . . . . . NTS (E)

DESCENT.

1. CREW ALERTED . . . . . (CP)
2. ALTIMETERS . . . . . SET (P,CP,E)
3. FUEL PANEL . . . . . SET (E)
4. PRESSURIZATION . . . . . SET (E)
5. LIGHTS . . . . . AS REQUIRED (E)
6. MASTER ARM AND SEARCH POWER . . . . . AS REQUIRED (P)
7. IRDS . . . . . AS REQUIRED (CABIN)
8. RAWS AC CKT BREAKERS (4000 FT) . . . . . AS REQUIRED (E)

APPROACH.

1. LIGHTS . . . . . AS REQUIRED (E)
2. SET CONDITION V . . . . . (CP)
3. ALTIMETERS . . . . . SET (P,CP,E)
4. LANDING WEIGHT AND SPEEDS . . . . . CHECKED (E)
5. SYNC SERVOS . . . . . OFF (E)
6. RADIOS, HSIs, FDS . . . . . SET (P,CP)

LANDING.

1. REPORT CONDITION V . . . . . (CABIN)
* 2. FLAPS . . . . . AS DESIRED (CP)
* 3. LANDING GEAR . . . . . DOWN AND DETENT (P,CP,E)
* 4. BRAKES . . . . . CHECKED (P)
* 5. HARNESS . . . . . SET (P,CP,E)

AFTER LANDING.

1. CREW (FROM DITCH STA) . . . . . RELEASED (P)
* 2. LIGHTS . . . . . AS REQUIRED (E)
3. IFF . . . . . OFF (CP)
* 4. OIL COOLERS . . . . . SET (E)
* 5. FLAPS . . . . . AS DESIRED (CP)
6. ICE CONTROL PANEL SWITCHES . . . . . OFF (E)
7. FUEL BOOST PUMPS . . . . . OFF (E)
8. APU . . . . . START (E)

SECURE.

* 1. PARKING BRAKES . . . . . SET (P)
2. WINDSHIELDS, PITOT, AOA HEAT . . . . . OFF (E)
* 3. HYD PUMPS 1 AND 2 . . . . . OFF (E)
* 4. OIL COOLERS . . . . . LESS THAN 100 PERCENT (E)
5. ASW EQUIPMENT . . . . . SECURED (P,TC)
* 6. ENGINES . . . . . SHUT DOWN (E)
7. CHOCKS . . . . . IN PLACE (P)
8. HYD PUMP 1A . . . . . OFF (E)
9. UTILITY LIGHTS . . . . . OFF (P,CP)
10. START SELECTOR . . . . . OFF (E)
* 11. ANTI-COLLISION LIGHT . . . . . AS REQUIRED (E)
12. RADIOS, RADAR ALTIMETER, INERTIALS . . . . . OFF (P,CP)
13. APU . . . . . AS REQUIRED (E)
14. START ESS AC CKT BREAKER . . . . . OUT (E)
15. OIL TANK SHUTOFF VALVE CKT BKRS . . . . . IN (E)

*Abbreviated checklist.

Figure 3-10. P-3C Normal Checklist

P-3C EMERGENCY CHECKLIST

EMERGENCY SHUTDOWN.

1. EMER SHUTDOWN HANDLE	PULL (E)
2. HRD (FIRE ONLY)	DISCHARGED (E)

If Confirmed Engine Fire Persists:

a. OIL TANK SHUTOFF VALVE CKT BKR	AS REQUIRED (E)
b. ALTERNATE HRD	AS REQUIRED (P,E)
3. PROPELLER	FEATHERED (P,CP,E)
4. FEATHER BUTTON LIGHT	OUT (E)
5. CROSS FEED AND BOOST PUMPS	CHECKED (E)
6. TANK 5 TRANSFER VALVE (FAILED ENG)	CLOSED (E)
7. POWER LEVER (FAILED ENG)	FULL FORWARD (E)
8. SYNC MASTER	AS DESIRED (E)
9. SYNC SERVO (FAILED ENG)	OFF (E)
10. APU	AS REQUIRED (E)

WING FIRE.

ACCOMPLISH EMERGENCY SHUTDOWN PROCEDURE.

ENGINE FIRE ON THE GROUND.

1. EMER SHUTDOWN HANDLE	PULL (E)
2. HRD	DISCHARGED (P,E)
3. START BUTTON	PULL (E)
4. CONTROL TOWER	NOTIFIED (P,CP)
5. FLAPS	TAKEOFF OR APPROACH (CP)

If Fire Is Not Out After 10 Seconds:

6. OIL TANK SHUTOFF VALVE CKT BKR.	SET (E)
7. HRD TRANSFER	ALTERNATE (P,E)
8. HRD	DISCHARGED (P,E)
9. EMER SHUTDOWN HANDLES	PULL (E)
10. SECURE APU, EVACUATE AIRCRAFT AT DISCRETION OF PILOT.	

BRAKE FIRE.

1. REQUEST GROUND FIREFIGHTING EQUIP	(CP)
2. STOP AIRCRAFT	(P)
3. RPM SWITCH (ENG OVER BURN WHEEL)	NORMAL (E)
4. POWER (ENG OVER BURN WHEEL)	APPROX 1000 HP (P)
5. FLAPS	TAKEOFF OR APPROACH (CP)
6. EMER SHUTDOWN HANDLES (ENGINES NOT BEING USED)	PULL (E)
7. UNNECESSARY CREWMEMBERS	EVACUATE (P)

On Arrival of Ground Firefighting Equip:

8. EMER SHUTDOWN HANDLE(S)	PULL (E)
9. SECURE APU, EVACUATE AIRCRAFT AT DISCRETION OF PILOT.	

DITCHING (PARALLEL THE SWELLS).

1. ALERT CREW (TIME TO IMPACT)	ALERTED (CP)
2. BARO AND RADAR ALTIMETERS	AS REQUIRED (CP)
3. DEPRESSURIZE	AS REQUIRED (E)
4. JETTISON	AS REQUIRED (P)
5. DITCH HEADING	CHECKED (CP)
6. DITCHING SPEED	CHECKED (CP,E)
7. EMERGENCY MESSAGE/IFF	EMERGENCY (CP)
8. FLAPS	AS DESIRED (CP)
9. LANDING GEAR	UP (CP)
10. AUX VENT/OUTFLOW VALVE	CLOSED (E)
11. HARNESS	LOCKED (P,CP,E)

NOTE: Boxed Items Are Recall Items.

FUSELAGE FIRE OR ELECTRICAL FIRE OF UNKNOWN ORIGIN.

1. ALERT CREW, ACTIVATE FIRE BILL	ALERTED (CP,TC)
2. CABIN EXHAUST FAN	OFF (E)

If Fire Source Is Not Determined:

3. BUS A	OFF (E)
4. BOOST LEVERS	PULL (E)
5. BUS B	OFF (E)
6. GENERATORS 2 AND 3	OFF (E)
7. SMOKE MASKS	IF NECESSARY (P,CP,E)
8. DUMP EITHER LEFT OR RIGHT EDC	DUMP (E)
9. EMERGENCY DESCENT	IF REQUIRED (FLIGHT IDLE, MINIMUM DIFFERENTIAL, DUMP REMAINING EDC)
10. ESS BUS	OFF (E)

If Fire Persists:

11. GENERATOR 4	OFF (E)

SMOKE OR FUME ELIMINATION.

1. SMOKE MASKS	ON, OXYGEN 100% (P,CP,E)
2. DESCEND AS NECESSARY	(P)
3. CABIN EXHAUST FAN	ON (E)
4. DEPRESSURIZE	

With Electrical Power Available:

a. AUX VENT	OPEN (E)

Without Electrical Power Available:

a. DEPRESSURIZE PNEUMATICALLY	(E)

If Smoke or Fumes Persist:

5. FREE FALL CHUTE	OPEN (OBS)
6. OVERHEAD SMOKE REMOVAL DOOR	OPEN (E)
7. REDUCE AIRSPEED (170 KNOTS MAX)	(P)
8. RIGHT EMERGENCY EXIT	OPEN (E)

RESTORING ELECTRICAL POWER.

1. OXYGEN SELECTORS	OFF (P,CP,E)
2. AFFECTED EQUIPMENT	DISCONNECT (E)
3. ELECTRICAL LOAD	REDUCE TO MINIMUM (E)
4. SYNC SERVOS	AS REQUIRED (E)
5. GENERATORS (ONE AT A TIME)	ON (E)
6. BUS SWITCHES (ONE AT A TIME)	ON (E)
7. ELECTRICAL LOAD	RESTORE AS REQUIRED (E)
8. START SELECTOR	OFF (E)
9. CABIN EXHAUST FAN	ON (E)
10. GOVERNOR INDEXING	SET (E)

EMERGENCY DEPRESSURIZATION.

With Electrical Power Available:

1. AUX VENT	OPEN (E)
2. OUTFLOW VALVE	OPEN (E)
3. EDCs	DUMP (E)
4. AUX VENT	CLOSE AT 1 IN. DIFFERENTIAL (E)

Without Electrical Power Available:

1. FREE FALL CHUTE	OPEN (OBS)

Figure 3-11. P-3C Emergency Checklist

PART 2—NORMAL PROCEDURES—TACCO

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MISSION RESPONSIBILITIES.

The tactical coordinator (TACCO) function is to employ appropriate tactics and procedures to most effectively carry out the mission of the aircraft and its crew. He will initiate a coordinated plan of action for all tactical crewmembers and continuously monitor, review, and revise the plan as the situation dictates. He will make decisions regarding search and kill stores selection and release. He is responsible for effective employment of the aircraft and crew during tactical operations and for the accurate completion, collection, and diposition of all magnetic tapes and records. The TACCO directs the pilot in the positioning of the aircraft by the use of fly-to-points indicating tactical patterns to be flown through range and bearing information on the pilot HSI, steering directions on the pilot FDI, and tactical data on the pilot display. The deployment of search stores is determined by the TACCO and is normally accomplished with the computer. The ordnanceman when directed by either TACCO or pilot may select and launch a store either manually from a preloaded SLT or PSLT or in the event of complete equipment malfunction, through the free-fall chute. Kill stores are selected by the TACCO in conjunction with the pilot. The TACCO must preset certain kill stores. All kill stores except missiles, rockets, and flares may be released under computer control by the pilot, copilot or TACCO. In the off-line mode, the pilot, copilot, or TACCO may drop all kill stores except rockets and flares which can only be launched by the pilot or copilot.

NEW NEW

During ASW operations, the TACCO maintains and updates his plot as required. The TACCO provides steering commands to the pilot via the central computer and in cooperation with the NAV/COMM officer updates the geographic position of the aircraft.

By means of data link, the TACCO relays tactical data or receives tactical data to aid in the successful completion of the mission. The TACCO may select additional data to be extracted for later analysis via the MTT* or DMTU** as well as recovering the operational program in the event of a fault. The TACCO coordinates the effort of sensor station 1 and 2, advising of the possibility of contact as well as informing them of surface traffic, and the spatial sonobuoy distributions. In directing the efforts of the sensor station 3 operator, the TACCO ensures that proper radar and ESM discipline is maintained, and should alert the operator of the probability of an impending MAD mark.

PREFLIGHT DUTIES.

The TACCO shall do the following before takeoff:

1. Give the mission briefing prior to flight. He shall obtain information from the operational commander regarding the mission objectives. He shall thoroughly familiarize himself with predicted environmental data for the assigned area of operations, and in turn, brief the crew on the pertinent aspects of the environmental predictions.

2. Ensure readiness for flight of all systems in accordance with NAVAIR 01-75PAC-12 series (Crew Station Maintenance Manuals).

3. Preflight survival equipment.

*Aircraft BUNO 156507 through 161131 except 159889
**Aircraft BUNO 159889, 161132 and subsequent

4. After the operational program is loaded:

a. Ensure proper programming of MTTs* or DMTU** (data extraction/data recovery) for assigned mission.

b. Ensure that all search stores are properly stowed, and stores loading information is entered into the computer inventories.

c. Ensure that kill stores are loaded and stores loading information is entered into the computer inventory.

WARNING

Prior to ARM/ORD initialization, post safety man at sonobuoy launch area.

d. Initialize the ARM/ORD and data link systems.

e. Receive reports of preflight checklist completion by all other crewmembers. Report "Tactical Crew Checklist complete" to pilot.

Tactical Crew Checklist

1. Comm/Crypto Gear . . . . . .Aboard
2. Paper (AQA-7, HSP, MAD BT). . . .Aboard
3. Tapes (Data Extract, AQH-4). . . . .Aboard
4. Programmable Calculator . . . As Required
5. Cameras, Film and Binoculars As Required
6. Celestial Forms/Pubs and Navigation Charts . . . . . .Aboard
7. TACCO Bag, Mission Brief, ASRAPS . . . . . As Required
8. Search/Kill Store Loading Checklist . . . . . As Required
9. Arm/Ord Initialization . . . . . As Required
10. Crew Preflights . . . . . Complete
11. Survival Equipment . . . . . .Checked
12. IFT Toolbox Inventory . . . . . Complete
13. NFO/Aircrew NATOPS Flight Manual . . . . . .Aboard

f. Report to the pilot when he has visually inspected the cabin for proper equipment stowage and crew readiness for takeoff. For night takeoff, the cabin shall be darkened to provide adequate night vision for crewmembers in the event of an emergency.

IN-FLIGHT DUTIES.

1. Coordinate the setting of proper battle/flight condition(s) with the pilot.

2. Upon setting Condition III, an in-flight equipment check shall be made. The TACCO shall subsequently ascertain the status from all tactical crewmembers and ensure that the status tableau is updated. The TACCO at this time determines the ability of aircraft and crew to complete the assigned mission.

3. Ensure effective employment of the P-3C weapons system through crew management and coordination consonant with current tactical publications and procedures.

4. Be prepared to assist the pilot in carrying out emergency procedures contained in Section V, Part 1.

5. Act as visual observer when required.

POSTFLIGHT DUTIES.

1. Ensure that all equipment is properly secured. Collect tactical records.

2. Ensure that equipment/program discrepancies are properly documented.

3. Attend mission debriefing.

*Aircraft BUNO 156507 through 161131, except 159889
**Aircraft BUNO 159889, 161132 and subsequent

PART 3—NORMAL PROCEDURES—NAV/COMM

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MISSION RESPONSIBILITIES.

It is the responsibility of the NAV/COMM to maintain an accurate record of present and past positions, to insert navigation fly-to-points, update geographical position, transmit tactical messages as authorized for release by the aircraft commander, set up radio equipment before flight, and maintain a record of the flight. The NAV/COMM is responsible for navigating the aircraft to the specified operational area and transmitting aircraft position reports in accordance with directives promulgated by the operational commander. The NAV/COMM shall provide data link assistance as directed by the TACCO. The NAV/COMM shall also monitor navigation systems in use. The TACCO shall be advised of navigation system failures.

During a tactical mission, close coordination is necessary between the NAV/COMM and TACCO. The following paragraph describes how the NAV/COMM integrates the equipment under his control with the TACCO during various phases of the ASW mission. The NAV/COMM shall be familiar with all ASW sensors and be prepared to direct the tactical crew, should the situation arise.

On a tactical mission the NAV/COMM is responsible for navigating the aircraft to the specified area. During the target detection, localization, and attack phases of the problem the NAV/COMM will provide assistance as directed by the TACCO. The NAV/COMM will monitor navigation systems in use and be prepared to switch systems. The TACCO shall be advised prior to switching navigation systems. The NAV/COMM normally transmits tactical messages authorized for release. These messages are drafted by the TACCO or NAV/COMM. Authentication, if required is accomplished or checked by the NAV/COMM.

PREFLIGHT DUTIES.

1. Briefing. Pertinent information regarding route of flight, restricted areas, and communications plan. All procedures shall be clearly understood. Be prepared to brief crew at plane side brief.

2. Flight Plan. The flight plan and preflight log shall be prepared by the pilots and the NAV/COMM, utilizing predicted winds and temperatures.

3. Review aircraft yellow sheets.

4. HOWGOZIT Chart. Ensure that the HOWGOZIT chart is prepared (when required), in accordance with current instructions promulgated by the operational commander.

5. NAV/COMM Equipment Inventory. Inventory all navigation and communication equipment. The following equipment is mandatory for overwater flights:

a. Sextant, including power cable.

b. Chronometer.

c. Appropriate charts.

d. Forms:

(1) Navigation logs.
(2) Graph paper.
(3) Celestial sight forms.
(4) Message forms.

e. Publications:

(1) Air Almanac.
(2) HO 249, Volumes I, II, III.
(3) ACP 131 or equivalent.
(4) NAVAIR 01-75PAC-12-3.
(5) Crypto.
(6) Authentication.
(7) Appropriate COMM OP PLAN.

f. Cryptographic equipment.

g. Computers, divider set, plotter, pencils, erasers and masking tape.

6. Set radios to receive WWV or CHU transmissions and provide time hack to pilot station and sensor station 1 and 2.

7. Safety. Review safety requirements for flight.

WARNING

Ensure that high intensity strobe light is secured prior to conducting sextant preflight or celestial observation.

8. Preflight shall be performed as delineated in NAVAIR 01-75PAC-12-3 (Crew Station Maintenance Manual, Navigation/Communication Station). The preflight and operational checks for individual systems shall not be conducted until a general visual inspection of each system is conducted. This inpection shall include rack security of the system components, security of all connections, and a check of circuit breaker panels.

9. Preflight survival equipment.

10. Complete initialization of the operational program.

Note

Mark time shall be completed prior to mark on top for correct operation of data retrieval program selected time interval function.

11. Complete all other applicable tableaux, inserting fly-to-points, PIM, data link reference points, and equipment status.

12. Advise TACCO of equipment status and completion of readiness tests and preflight and operational checks.

IN-FLIGHT DUTIES.

1. Upon initial Condition III being set, promptly establish communications with controlling station via out/departure report, (as briefed) verifying that both HF-1 and HF-2 are operating properly. Report to aircraft commander that communications are established. Check operation of teletype and cryptographic equipment (if not used for initial establishment of communications). Report equipment status to TACCO. Advise TACCO of which navigation system is selected for enroute and tactical use.

2. Monitor navigation equipment and aircraft position. Perform geogrphic corrects as required to update NAV systems and DR track.

3. Monitor frequencies as directed by operational doctrine.

4. Transmit messages when directed by the aircraft commander.

5. Transmit emergency messages at any time necessary.

6. Assist the TACCO as directed in establishing operation of data link.

7. Act as visual observer when required.

8. Operate BT recorder.

9. Maintain complete flight navigation and communications record.

10. Update MAGVAR when utilizing ASN-84 in back-up modes of operation.

11. Check TAS after level off. Compare TAS indicated with TAS computed using MB-9 computer. Variance should not exceed 5 knots.

12. Ensure the HOWGOZIT is maintained (when required).

POSTFLIGHT DUTIES.

1. The NAV/COMM shall ensure that all navigation systems are secured prior to leaving the aircraft.

2. Secure all communications equipment.

3. Collect and account for all communications materials. Ensure encryption devices are zeroized and classified frequencies are cleared.

4. Attend debriefing as directed.

5. Properly record all equipment discrepancies.

6. Attend debrief with logs and records.

NEW NEW NEW NEW NEW

PART 4—NORMAL PROCEDURES—SENSOR 1 AND 2

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MISSION RESPONSIBILITIES.

It is the responsibility of the acoustic sensor operators to detect and classify contact data. The audio information is recorded for subsequent mission reconstruction. The determination of sono target evaluation will be in close conjunction with the TACCO for the determination of buoy types. RFs target signatures, surface traffic and the aggregate ASW environment. (See figure 1-11 for an illustration of sensor stations 1 and 2.)

FLIGHT PLANNING.

1. Attend the brief as directed.

2. Review discrepancies log of last 10 flights for outstanding discrepancies.

3. Ensure that sufficient SDR paper, AQH-4 tapes, and four spare styli per station are aboard the aircraft.

PREFLIGHT DUTIES.

1. Perform turnaround checklist duties as directed.

2. Perform visual inspection of all bays, racks and equipment for security and installation of all sensor station 1 and 2 equipment.

3. Preflight survival equipment.

4. Annotate the AQA-7 chart paper with the following minimum information at the beginning and end of the chart paper:

a. Classification.
b. Squadron.
c. Operator.
d. TACCO.
e. Date.
f. Aircraft BUNO.
g. Event No.
h. Crew.
i. PPC.
j. Sensor Station No. (1 and 2)

5. In conjunction with the tactical crew, perform systems readiness test, ascertaining readiness for flight of the following equipment by referring to NAVAIR 10-75PAC-12-4, Section 2 Crew Station Maintenance Manual:

a. ARR-72 Sonobuoy Receiver Group
b. AQA-7 DIFAR System
c. HYFIX Measuring Unit
d. Directional Listening Control
e. ASA-76 CASS System

6. Perform applicable off-line checks in accordance with NAVAIR 01-75PAC-12-4 on the following equipment:

a. Station Lighting
b. Sono Receiver/ICS
c. AQH-4
d. TD-900/AS
e. AQA-7
f. ASA-76
g. UYQ-8

7. The AQH-4 tape shall be annotated with the following minimum information at the beginning of each tape:

a. Classification
b. Squadron
c. Operator
d. TACCO
e. Date
f. Aircraft BUNO
g. Event No.
h. Crew
i. PPC
j. Reel No.
k. Time reel started

8. With operational program, confirm correct operation and control of sensors (refer to NAVAIR 01-75PAC-12-4).

9. Set and synchronize time code generator with NAV/COMM.

EQUIPMENT STATUS REPORT.

1. Advise the TACCO of equipment status and completion of preflight checklist. Report equipment status to TACCO.

PREPARATION FOR TAKEOFF AND LANDING.

1. Secure loose equipment at station.
2. Hard hat donned (visor down).
3. Gloves on.
4. Seat facing aft.
5. Seat back fully erect.
6. Seat fully lowered.
7. Headrest properly extended.
8. Lap belt fastened.

CONDITION III EQUIPMENT CHECK.

1. Preliminary settings.
   a. ARR-72.
      (1) SONO RECEIVER POWER/OFF – Up.
      (2) All DCCIs at sensor station 1 and sensor station 2 – Set to desired channel.
      (3) ASSG.
         (a) POWER – ON (amber).
         (b) MODES – EXT MOD (amber).
         (c) CHANNEL SELECT – As required.
   c. AQH-4;
      (1) POWER – Amber.
      (2) FAST – Amber.
      (3) RECORD – Amber.
2. SDR/BFI LOFAR and DIFAR checks.
   a. BFI.
      (1) POWER – ON.
   b. SDR.
      (1) POWER – On (POWER ON indicator lights steady red, stylus assembly should sweep, and chart paper should move).
      (2) BAND (4) – NORM and FULL (amber).
      (3) CAL – On (amber) for 30 seconds then off (green). Check calibration lines on grams at 50, 100, 150, 200, and 250 Hz.
      (4) BITE – On (amber). Bite from DIFAR appears on ASSG modulation deviation meter at approximately 25 percent.
   c. Tape Monitor Control Panel.
      (1) PASSIVE, DIRECT/TAPE switches – TAPE (amber) for 60 seconds.
      (2) Ensure all channels are recoding.
   d. BFC.
      (1) DISPLAY MODE) DIFAR – Amber.
   e. SDR.
      (1) TRACK BRG (4) – Amber.
      (2) Check HZ (frequency) and DEG (bearing) readout accuracy for one line.
   f. BFC.
      (1) DISPLAY MODE-OMNI SEARCH – Amber.
      (2) TRACE A through D – EXTD – Amber.
   g. SDR.
      (1) BAND (4) – EX or EXTD – Amber (check for BITE pattern).
      (2) Check HZ (frequency) and DEG (bearing) readout accuracy for one line.
3. Range check.
   a. SDR.
      (1) BITE – Off (green).
   b. ASSG.
      (1) MODES – ACTIVE RO/FR (amber).

Note

ASSG should be on channel 10 through 16 or 26 through 31 to produce sufficient trigger level for activation of the DIFAR range display.

   c. BFC.
      (1) DISPLAY MODE-RANGE – Amber.
      (2) 6K YD – Amber.
   d. BFI.
      (1) SEA WATER TEMP DEG F – 54.
   e. BFC.
      (1) Range display indicates approximately 4525 yards.
4. Report equipment status to TACCO.

Note

Place all equipment not presently needed for flight in standby.

POSTFLIGHT DUTIES.

1. Annotate and remove SDR chart paper and magnetic tape from AQH-4.
2. Secure all station equipment and comply with current NAVAIR directives.
3. Ensure all equipment discrepancies are logged.
4. Attend debriefing with acoustic tapes and SDR grams as directed.

PART 5—NORMAL PROCEDURES—SENSOR STATION 3

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MISSION RESPONSIBILITIES.

The sensor station 3 operator mission is to determine the position of a submarine by detecting changes in earth's magnetic field caused by the submarine's hull; to detect and analyze radar targets of operational significance and provide radar intercept and navigation information to the TACCO. He also challenges the identity of these targets. In addition, the sensor station 3 operator will passively detect targets of military significance using ESM.

During magnetic and submarine anomaly detection (MAD and SAD), the TACCO/pilot notifies the sensor station 3 operator that the aircraft is approaching the possible target location. The sensor station 3 operator announces the presence of targets in the area as indicated by the ESM equipment. The sensor station 3 operator announces bearing and range of targets orally and/or by keyboard functions, detected by the search radar set and challenged by the airborne aircraft interrogator. The TACCO will specify the operational employment of the radar and challenging by radar recognition set (EMCON).

FLIGHT PLANNING.

1. Attend the preflight briefing, as directed. Pertinent information regarding recognition codes, friendly operative units, and applicable radar navigation checkpoints and radar discipline shall be clearly understood.

2. Review discrepancies log of last ten flights for outstanding descrepancies.

3. Ensure that suitable radar navigation charts are aboard the aircraft.

4. Ensure sufficient MAD recorder chart paper on board the aircraft to complete the mission (a full roll of chart paper will last approximately 5 hours and 20 minutes continuous operation in 3-inch-per-minute mode).

5. Check ASRAPS (Acoustic Sensor and Range Prediction Service) data, or monitor WWV, or WWVH for alpha index.

Note

Alpha index of 25 or greater may result in degraded MAD effectiveness.

PREFLIGHT DUTIES.

1. Coordinate preflight with other crewmen in accordance with current NAVAIR directives.

2. Complete a visual inspection of each system to include:

   a. Rack security of the system components.

   b. Security of all connections.

   c. Circuit breaker panels.

3. Preflight survival equipment.

4. Press NORMAL/TEST switch on the light control panel. Ensure applicable annunciator lights are illuminated.

5. Check ICS for proper operation.

6. In conjunction with the tactical crew, perform Sensor Station 3 SYGNOG and Manual Checks as specified in NAVAIR 01-75PAC-12-5 Section 2.

7. With operational program, confirm correct operation and control of sensors.

8. Annotate the RO-32/ASQ recorder paper with the following minimum information:

Classification

Squadron

Crew

PPC

Operator

Aircraft Side No./BUNO

Event

Alpha Index

TACCO

Date

9. Annotate the RO-32 with the following symbols, as applicable during MAD operation:

Symbol	*Meaning*
N	Magnetic heading
2.5	Sensitivity
△	Test Signal
90°	Turn-direction/amount
180K	Airspeed
A90	Altitude 100 ft
⊕	Yaw ± 5 degrees
⊖	Roll ± 10 degrees
◐	Pitch ± 3 degrees
R	Nose right or right wing down
L	Nose left or left wing down
U	Nose up
D	Nose down

EQUIPMENT STATUS REPORT.

1. Advise TACCO of equipment status and completion of preflight checklist. Report equipment that is inoperative or operating at reduced efficiency.

PRETAKEOFF.

1. Ensure the following steps are accomplished prior to taxi:

a. Search radar antenna control panel STAB to OUT.

b. MAD (as required).

Note

The ASQ-81 POWER switch shall be on only during preflight, compensation, Condition III checks, or tactical operation.

CAUTION

The ASQ-10A POWER switch shall be left ON and function switch in HTR REG or B+ during takeoff, flight, landing, and taxi to prevent damage to the detector head.

c. IRDS turret retracted (if applicable). NEW

d. ALQ-78 POWER to STBY or ON.

CAUTION

The ALQ-78 POWER switch shall be set to STBY or ON during takeoff, flight, landing, and taxi to prevent damage to the antenna pedestal. All ESM components must be installed for antenna rotation. NEW NEW NEW NEW

e. Report ESM/MAD/IRDS status to the pilot as required.

f. After radar warmup complete, initialize RIU.

2. Preparation for takeoff.

a. Hard hat donned (visor down).

b. Gloves on.

c. Harness adjusted.

d. Seat fully lowered, seat back fully erected and headrest properly erected.

e. No loose gear at station.

IN-FLIGHT DUTIES.

1. Upon Condition III being set, an in-flight equipment check shall be made on all station equipment (as EMCON permits). Report equipment status to TACCO. In-flight maintenance procedures may be found by referring to NAVAIR 01-75PAC-12-5.

2. The following minimum Condition III checks shall be performed:

Note

These in-flight check procedures are to be used in conjunction with current software functions as described in the applicable sensor station 3 SOM (NAVAIR 01-75PAC-11 series).

a. ASA-70/AYA-8.

(1) Check for character display and correct alignment.

(2) Check trackball for freedom of movement and associated-hook movement in all quadrants of display area.

b. APS-115/APX-76.

(1) Activate radars on-line.

(2) Check video, display scales, and PRF modes for correct operation.

(3) Select BRKT CHALL switch to CONT.

(4) Observe IFF replies for all modes. (If transponders of opportunity are not present, this check may be accomplished utilizing the loop test function).

c. ALQ-78.

(1) Select SYS LOW on SYSTEM TEST selector and push START TEST.

(2) Observe and process ESM test signal checking RF, PRF, PW and bearing accuracy within tolerances contained in NAVAIR 01-75PAC-1A.

(3) Select SYS HIGH on SYSTEM TEST selector and push START TEST.

(4) Observe and process ESM test signal checking RF, PRF, PW and bearing accuracy within tolerances contained in NAVAIR 01-75PAC-1A.

(5) Select OFF on SYSTEM TEST selector.

NEW NEW NEW NEW NEW NEW NEW NEW NEW NEW NEW NEW NEW

d. AAS-36 IRDS.

(1) Coordinate extension of IRDS turret with the pilot.

(2) Select MANTRK, then BIT ON.

(3) Adjust video level, gain, contrast and brightness. Ensure that 10 shades of gray and black and white are visible.

(4) Ensure target tracking sight control (TTSC) will correctly operate turret in all modes.

(5) Select CPTRTRK. Verify correct software operation.

e. RO-32/ASQ-10 or ASQ-81.

(1) Perform RO-32 calibration as required.

(2) ASQ-10 only.

(a) Perform calibration cancellation and orientation.

(b) Monitor sense straight and level noise for 1 minute. Peak-to-peak noise shall not exceed 0.15 gamma (1.5 major division).

(3) ASQ-81 only.

(a) Bandpass selectors to 0.6 and 0.04.

(b) Monitor sense 1 straight and level noise for 1 minute. Peak-to-peak noise shall not exceed 0.05 gamma (2.5 minor divisions).

3. The following procedures should be performed upon entering the operating area at MAD altitude.

a. ASQ-81 Bandpass Filter Adjustment Procedure (if applicable).

To achieve maximum detection range consistent with the local geologic noise, the following procedures should be utilized once the aircraft is at MAD operating altitude.

(1) Place lower BANDPASS selector to 0.04. Place upper BANDPASS selector to 0.6.

(2) Adjust γFS switch so that noise indication on RO-32 chart is between 1 and 2 major divisions.

(3) Using the values of the γFS and lower bandpass from steps (1) and (2) above, determine the γFS bandpass index value from the Bandpass Index Table.

γFS–BANDPASS INDEX TABLE

Lower Bandpass Selector Position	γFS				
	0.1	0.2	0.4	1.0	2.0
0.04	100	80	60	40	20
0.06	96	75	55	38	19
0.08	87	70	52	36	18
0.1	65	58	48	34	17

(4) Select the combination of γFS and lower bandpass values (depicted in bandpass index table) which yield the maximum numerical value of the γFS bandpass index while maintaining a noise indication on the RO-32 recorder between 1 and 2 major divisions. Example: Steps 1 and 2 yield γFS of 1.0 and lower bandpass of 0.04 which corresponds to an index of 40.

(5) The operator should attmept to achieve a higher index by first selecting lower bandpass of 0.06 and γFS of 0.4 which would yield an index of 55 providing that the RO-32 noise indication remains between 1 and 2 major divisions. Repeat procedures as appropriate.

Note

Changes in local noise conditions may require selection of a new combination of γFS and lower BANDPASS selector positions to yield a greater value of the γFS bandpass index. The operator should annotate γFS and lower BANDPASS selector values on the RO-32 chart for the purpose of postflight analysis.

b. ASA-64/71 Adjustment Procedure.

(1) Set SAD THRESHOLD ADJUST.

(a) To use the SAD Threshold Voltage chart, determine average geological noise level in the operating area by inspection of several minutes of MAD system noise. Locate this noise level in the chart and choose an associated threshold voltage. If the MAD operator is familiar with the geological noise of the operating areas, the SAD THRESHOLD ADJUST can be set before the aircraft enters the operating area.

SAD THRESHOLD VOLTAGE

Peak-to-Peak Noise, RO-32 in Major Divisions	0 to 2.0	2.5 to 4.0	4.0 to 5.0
Threshold Voltage Setting in Volts	2.5 to 3.0	5.0 to 6.5	6.0 to 7.0

4. Utilize RADAR/IFF, MAD/SAD/IRDS, and ESM systems as directed by the TACCO to support the mission.

5. Maintain accurate contact data through the use of the DPS.

6. Annotate RO-32 chart with proper symbols as required.

MAGNETIC COMPENSATOR GROUP ASA-65(V)5.*

PREFLIGHT GROUND CHECKS.

The ASQ-81 detecting set control (figure 8-140) should be set initially to the following values:

PWR switch	–	ON
CAL switch	–	OFF
ALT COMP switch	–	OFF (ALT compensator is never used with CGA)
γFS	–	1
L Band Pass	–	0.06
H Band Pass	–	0.60

*Aircraft BUNO 161368 and subsequent.

On the ASA-65 magnetic compensator control, set controls as follows:

MAG TERM	—	OFF
RATE	—	OFF
+OFF-	—	OFF
SERVO	—	ON
POWER-OFF	—	POWER

Servo Drive Check.

1. Record all nine-term counter settings on data sheet, figure 3-12., and proceed as follows:

MAG TERM	—	T
RATE	—	4

2. Hold UP-DOWN switch to UP. Check that counter runs toward 999.9.

3. Switch to DOWN. Check that counter runs toward proper setting of T term.

4. Set RATE switch to 1 for final adjustment. Reset T to original value.

5. Set RATE switch to OFF.

CGA IN - FLIGHT PROCEDURES.

Equipment Check.

Set up ASA-65, ASQ-81, and MAD display as per Manual Compensation Procedure except set ALT COMP switch to OFF at all times.

NEW On the CGA magnetic field indicator, set the MODE switch to OFF and the PWR-OFF switch to PWR. Set the WPN LOAD switch to the number of MK-46 torpedoes loaded for flight.

Compensation Procedure.

1. Set the MAD detector bandpass to 0.06 and 0.6, the ALT COMP switch to OFF, and γFS to 1.

2. Measure and record S&L (straight and level) MAD detector noise on each cardinal heading. The background noise should be 0.03 gamma or less with gradient (low frequency) noise, less than 0.3 gamma. Over shallow water or land, an altitude of 10K to 18K feet is normally used.

3. On the magnetic compensator control, set controls as follows:

POWER-OFF	—	POWER
SERVO-OFF	—	SERVO
ALL COUNTERS	—	LAST KNOWN COMP. VALUES
+OFF-	—	OFF
MAG TERM	—	OFF
RATE	—	OFF

4. Assume initial desired heading, airspeed and altitude, and set up CGA magnetic field indicator as follows: NEW

MODE	—	COMP
PWR-OFF	—	PWR

5. Press EXEC once. An update program with a 10-minute limit is now in operation. Immediately begin desired maneuvers.

6. Upon completion of maneuver, turn immediately to the next heading.

7. If the maneuver program is completed before the 10-minute limit, repress EXEC when complete. Wait until EXEC indicator extinguishes (about 2 seconds).

Compensation Adjustment Procedure.

Upon completion of Compensation Procedure, proceed as follows to obtain optimum aircraft compensation. A record sheet (figure 3-12) should be prepared for operator assistance.

1. On the CGA magnetic field indicator, set the MODE switch to T. NEW

2. Press EXEC. A polarity and value will be indicated on the display. On the magnetic compensator control, set the MAG TERM switch to T.

3. Record the T counter setting on the magnetic compensator control.

4. Add or subtract as required, the value indicated on the CGA.

Example:

T counter	545.2
CGA DISPLAY	-023.4
Set T counter to	521.8

5. On the magnetic compensator control, using the RATE and manual UP-DOWN switches, set T counter to new value.

COMPENSATION DATA SHEET

A/C NO: _____ A INDEX: _____ A/C LOAD CONFIGURATION: _____

DATE: _____ HEADINGS: CARDINAL/INTERCARDINAL:

AREA: _____ COMP. PROCEDURE: _____

INITIAL ASA-65 SETTINGS: T = ____ L = ____ V = ____

1 = ____ 2 = ____ 3 = ____

4 = ____ 5 = ____ 6 = ____

RUN NO. 1

START TIME: _____

FINISH TIME: _____

FOM NO. 1
(INITIAL SETTINGS)

NR	ER	SR	WR
NP	EP	SP	WP
NY	EY	SY	WY

TOTAL

FOM = _____ GAMMA

COMP. UPDATE FROM FOM NO. 1

INITIAL T = ____ L = ____ V = ____
±VALUE ____ ____ ____
NEW T = ____ L = ____ V = ____

INITIAL 1 = ____ 2 = ____ 3 = ____
±VALUE ____ ____ ____
NEW 1 = ____ 2 = ____ 3 = ____

INITIAL 4 = ____ 5 = ____ 6 = ____
±VALUE ____ ____ ____
NEW 4 = ____ 5 = ____ 6 = ____

RUN NO. 2

START TIME: _____

FINISH TIME: _____

FOM NO. 2
(FROM NEW SETTINGS)

NR	ER	SR	WR
NP	EP	SP	WP
NY	EY	SY	WY

TOTAL

FOM = _____ GAMMA

COMP. UPDATE FROM FOM NO. 2
(IF REQUIRED)

INITIAL T = ____ L = ____ V = ____
±VALUE ____ ____ ____
NEW T = ____ L = ____ V = ____

INITIAL 1 = ____ 2 = ____ 3 = ____
±VALUE ____ ____ ____
NEW 1 = ____ 2 = ____ 3 = ____

INITIAL 4 = ____ 5 = ____ 6 = ____
±VALUE ____ ____ ____
NEW 4 = ____ 5 = ____ 6 = ____

RUN NO. 3

START TIME: _____

FINISH TIME: _____

FOM NO. 3
(FROM NEW SETTINGS)

NR	ER	SR	WR
NP	EP	SP	WP
NY	EY	SY	WY

TOTAL

FOM = _____ GAMMA

COMP. UPDATE FROM FOM NO. 3
(IF REQUIRED)

INITIAL T = ____ L = ____ V = ____
±VALUE ____ ____ ____
NEW T = ____ L = ____ V = ____

INITIAL 1 = ____ 2 = ____ 3 = ____
±VALUE ____ ____ ____
NEW 1 = ____ 2 = ____ 3 = ____

INITIAL 4 = ____ 5 = ____ 6 = ____
±VALUE ____ ____ ____
NEW 4 = ____ 5 = ____ 6 = ____

Figure 3-12. Compensation Data Sheet

6. Set MODE switch on CGA to remaining eight terms and read polarity and values by pressing EXEC switch.

Weapon Drop Compensation.

1. Prepare the compensator group as follows:

GCA Magnetic Field Indicator	Control Position
PWR-OFF	PWR
MODE	W/D

Magnetic Compensator Control	Control Position
POWER-OFF	POWER
SERVO-OFF	SERVO
MAG TERM	L
RATE	OFF
+OFF-	OFF

2. After release of the weapon, press the EXEC pushbutton. Allow at least one complete tactical pattern, such as a 360 degree turn.

3. Repress the EXEC pushbutton to manually stop data gathering process. Wait until EXEC indicator extinguishes.

The following part of the adjustment procedures can be done when the operator has sufficient time to do so, as the selection of WPN DROP switch has adjusted compensation to eliminate at least 80 percent of the change caused by dropping a torpedo.

4. Set the selector to T.

5. Press EXEC and transfer DISPLAY value of T to work sheet as in example below:

Original setting T counter	575.0
CGA DISPLAY	-30.5
Set T counter to	544.4

6. Determine correct settings for L, LL and LV.

SHUTDOWN PROCEDURE.

NEW

1. Set the CGA magnetic field indicator PWR-OFF switch to OFF.

2. Set the magnetic compensator control POWER-OFF switch to OFF.

3. Set ASQ-81 detecting set control PWR switch to OFF.

IN-FLIGHT OFF-LINE RADAR/IFF PROCEDURES.

The APS-115 radar and the APX-76 interrogator can be used in the off-line configuration for safety of flight (weather and aircraft avoidance) and limited tactical applications. The following procedure will enable off-line radar and IFF operation.

1. TACCO power control panel RDR scan, sensor station 3 MPD, and logic unit 3 switches to ON.

2. Set forward and aft APS-115 PWR-OFF switches to PWR.

3. Set APX-76 auxiliary SIF control SYSTEM POWER ON/OFF switch to ON.

4. Set scan converter control box to TEST position.

5. Set radar interface unit POWER ON-NORMAL/OFF switch to ON-NORMAL.

Note

Each command selection must be followed by pressing the ENTER switch.

a. Set STOR SINGLE/NORMAL toggle switch to SINGLE.

b. Set HV ON-OFF toggle switch to ON.

c. Set COMMAND SELECTION switch to ERASE.

d. Set COMMAND SELECTION switch to REGISTRATION.

e. Set COMMAND SELECTION switch to OFFSET.

f. Set PRF 1600/400 toggle switch as desired.

g. Set RAW RADAR A-SCAN/PPI toggle switch to PPI.

6. Sensor station 3 MPD display test/control panel.

a. Set OFF LINE-ANALOG switch to CHAN 4.

b. Set MODE SELECTOR switch to OFF LINE/ANALOG.

c. BRIGHTNESS — Set CHANNEL 4 knob to display PPI sweep.

NEW

7. Scan converter control box.

a. Rotate RANGE SEL MILES switch to desired range then press RANGE ENTER to select display range.

IN-FLIGHT SAFETY PROCEDURES.

The tactical crew, as well as the flight station crew must be aware of all factors which may affect safety if accidents are to be avoided. Whenever operation of the radar is permitted, it should be utilized to enhance safety of flight. The sensor station 3 operator can provide the following:

a. Surveillance for other aircraft during periods of low visibility. Use of the IFF interrogator and standard IFF settings used by FAA air traffic controllers is especially helpful.

b. Radar vectors to avoid hazardous weather conditions. Use of the lowest practical range and the high PRF function can be helpful in improving weather definition.

CAUTION

Heavy turbulence and hail may extend outward as far as 20 miles from a fully developed thunderstorm cell or cells.

c. Clearance from terrain and other obstructions during low level operations. Familiarity with navigation charts will provide information as to the location of known terrain obstructions.

d. Navigation fixing information. Use of navigation charts and a knowledge of expected aircraft track utilized in conjunction with the radar presentation can be useful in the event of navigation equipment failure or as a backup for other navigation equipment.

e. Assistance during instrument approaches and landings. Familiarization with approach procedures and local terrain will aid in the event of deviation from normal procedures.

LANDING AND SECURE.

1. Prior to landing ensure that:

a. Station properly rigged for landing (no gear adrift).

b. Set APS-115 STAB-OUT switch to OUT.

NEW

c. IRDS retracted.

d. Hard hat donned (visor down).

e. Gloves on.

f. Harness adjusted.

g. Seat fully lowered and headrest properly extended.

h. No loose gear at station.

2. Prior to leaving the aircraft, ensure the following steps are accomplished:

a. Sensor station 3 electronics equipment secured.

b. All equipment discrepancies logged.

c. Coordinate postflight with other crewmen in accordance with current NAVAIR directives.

NEW

d. Attend debrief with appropriate logs and records, as required.

PART 6—NORMAL PROCEDURES—ORDNANCEMAN

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MISSION RESPONSIBILITIES.

The ordnanceman shall act as loading crew chief when required for loading of all search and kill stores. He will work closely with his respective shop chief for loading operations performed by personnel other than the flight crew. He must obtain from the Tactics Officer, the sonobuoy and weapon load required for the mission and coordinate the delivery of these items to the aircraft. Depending on squadron policy, he will prepare the photographic systems for use by ensuring that camera magazines are loaded with film and magazines are loaded into the cameras. Assistance from the photographer mates may be required. In flight, the ordnanceman will perform the loading of the three pressurized sonobuoy launch tubes (PSLT) as required by the TACCO. Additional in-flight duties shall include acting as visual observer during takeoff and landing, photograph during rigging and, such other duties as may be required. He will provide the TACCO with a list of all types of stores aboard the aircraft.

PREFLIGHT DUTIES.

WARNING

Do not open or close bomb bay doors with personnel or equipment in the immediate vicinity of the bomb bay. Do not enter bomb bay without first verifying that bomb bay safety pin is installed and ensuring that the cable connecting the safety pin and door actuator cable is taut. Ensure that a lookout is posted in front of the aircraft to visually check that bomb bay is clear when opening or closing the doors.

CAUTION

All personnel approaching bomb bay area must be aware that air multiplier assembly damage may result by blocking air intake with caps or other foreign matter.

1. Operationally check out systems and load stores, in accordance with appropriate NAVAIR checklists.

2. Attend the mission briefing prior to flight for those portions applicable to his duties. Provide data on stores loaded and camera loading.

3. Review discrepancies log of last ten flights for outstanding discrepancies.

4. In conjunction with the tactical crew, perform System Readiness Test, ascertaining readiness for flight of the ordnance equipment by referring to NAVAIR 01-75PAC-12-6, Crew Station Maintenance Manual, Section 2, Armament/Ordnance Station.

5. Preflight survival equipment.

6. Reinspect all stores and ensure proper safety restraints are installed.

7. Ensure that a fiberglass free-fall insert is aboard aircraft (when available).

8. Report to TACCO when all armament/ordnance systems are ready for initialization.

WARNING

Prior to ARM/ORD initialization, post safety man at sonobuoy launch area.

9. Coordinate preflight with other crewmen in accordance with current NAVAIR directives.

10. Before turnup and with pilot approval, remove bomb bay and wing stores safety pins (except forward firing weapons); store in bomb bay stowage bin. Remove bomb bay door safety pin and have pilot close bomb bay doors.

11. Ensure sono safety switch on fuselage exterior is closed.

12. Proceed to arming/rearming area. Ground crew personnel will perform arming evolutions in accordance with applicable weapon loading checklists.

IN-FLIGHT DUTIES.

1. Upon Condition III being set, an in-flight equipment check shall be made. This check shall consist of the following:

WARNING

Condition III checks shall be performed over water whenever possible prior to ASW operations. This is to preclude the possibility of inadvertent release of stores over populated areas.

a. Check all armament/ordnance switches off/safe or normal and kill stores security.

b. All applicable circuit breakers in.

WARNING

Ensure upper PSLT doors shall remain closed during in-flight continuity check.

c. Perform continuity check on all loaded SLTs and check PSLTs for pressure leaks.

d. Ensure A275 box switches (numbered and lettered) off.

e. After these checks are completed an equipment status report shall be given to the TACCO.

Note

During an extended overland flight upon Condition III being set, a continuity check will be performed on all loaded SLTs with the SONO RELEASE LH and RH circuit breakers out. Once over water, another Condition III check will be performed in accordance with steps a through e.

2. Perform hydrophone and life and depth setting changes to sonobuoys stowed in the bins as the TACCO directs.

CAUTION

Class A free-fall insert shall be used when free-falling stores.

3. Perform loading/unloading of the PSLTs when directed by the TACCO via ordnance panel signals.

4. Monitor the release of both search and kill stores by observing bomb bay and wing stations for hung conventional kill stores, and in the case of search stores, the noise associated with the firing of the CAD device.

Note

During simulated or actual special weapons attacks, all observer stations and overwing hatches must be darkened. Crewmembers shall rig the aircraft as in Condition V.

5. Perform manual release of search stores when directed by the TACCO. This includes stores to be ejected from the free-fall chute, if required.

6. Act as visual observer during takeoff and landing when not otherwise occupied.

7. Act as photographer (using hand held camera) during rigging.

8. Perform in-flight maintenance as promulgated in NAVAIR 01-75PAC-12-6, Crew Station Maintenance Manual, Armament/Ordnance Station.

POSTFLIGHT DUTIES.

1. After landing, proceed to dearming area if required. Ground crew personnel will perform dearming evolutions in accordance with applicable weapon loading checklists.

2. Ensure sono safety switch is open.

WARNING

Unload misfires that were not, or could not be, jettisoned. Hand over to EOD.

3. If required, have pilot open bomb bay doors and install bomb bay door safety pin.

4. Safety-pin all bomb bay racks, starting with upper stations, using remote safing device, then lower stores with individual rack pins.

WARNING

Do not walk under stores that are not pinned.

5. Safety-pin wing stores (if carried).

6. Supervise flight crew in the unloading of stores. Assist ground crew personnel if they perform the function.

7. Accomplish unloading of camera film if required. Photographer assistance may be required.

8. Ensure that all equipment discrepancies are logged.

9. Coordinate postflight with other crewmen in accordance with current NAVAIR directives.

10. Attend the mission debriefing, if required.

PART 7—NORMAL PROCEDURES—FLIGHT TECHNICIAN

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MISSION RESPONSIBILITIES.

The technician's function is to troubleshoot and maintain the avionics systems in flight. He shall be thoroughly familiar with all avionics systems. In the event of malfunction, he shall be assisted by any available member of the crew. (See figure 1-14 for an illustration of the technician station.)

PREFLIGHT DUTIES.

1. Review discrepancies log for the last ten flights for outstanding discrepancies.

2. Ensure applicable tests equipment, tools, publications, in-flight maintenance kits, software programs, and scratch tapes are on board and properly stowed when not in use.

3. Perform visual inspection of all bays, racks, and equipment for security and installation.

4. Perform aircraft and avionics initialization as outlined in NAVAIR 01-75PAC-12.

5. Preflight survival equipment.

6. Load operational program.

7. Zeroize scratch tapes.

8. Report to the TACCO readiness to cycle operational program.

9. Report equipment status to TACCO.

10. Coordinate crew duties with other crewmen.

IN-FLIGHT DUTIES.

Upon Condition III being set, an in-flight equipment operating check shall be made of all stations. When these checks are completed, the technician shall deliver a status report of the digital systems to the TACCO.

The technician shall monitor the functioning of the avionics systems and take appropriate action, as required.

The technician shall act as a visual observer when not engaged in maintenance functions.

Note

In-flight maintenance procedures may be found by referring to NAVAIR 01-75PAC-12 (series). Crew Station Maintenance Manuals.

POSTFLIGHT DUTIES.

1. Remove extraction tape and deliver to TACCO.

2. Clear computer memory.

3. Zeroize the auto recovery tape.

4. Assist in shutdown and securing of avionics systems and equipment.

5. Properly record all discrepancies as directed by OPNAVINST 4790.2 (series).

6. Attend debriefing, as directed.

PART 8 — NORMAL PROCEDURES — OBSERVER

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MISSION RESPONSIBILITIES.

The observer shall be responsible for the following: Monitor the interior and exterior of the aircraft for any abnormal conditions, and take appropriate action as required.

PREFLIGHT DUTIES.

1. Attend the brief, as directed.
2. Knowledge of known equipment discrepancies.
3. Assist the flight engineer during preflight, as directed.
4. Preflight personal survival equipment.
5. Report equipment status to the flight engineer.

IN-FLIGHT DUTIES.

1. Perform Conditions of Flight, as directed.
2. Perform the observer (lookout) duties, as required.
3. Monitor the interior and exterior of the aircraft for any abnormal conditions, and take appropriate action as required.

POSTFLIGHT DUTIES.

1. Coordinate postflight with other crewmembers in accordance with current NAVAIR directives (Turnaround Checklist).
2. Assist the flight engineer in compiling and recording all aircraft discrepancies.

PART 9 —FUNCTIONAL CHECKFLIGHT PROCEDURES

THE INFORMATION CONTAINED IN THE FUNCTIONAL CHECKFLIGHT PROCEDURES MAY BE USED FOR NATOPS OPEN BOOK EXAMINATIONS BUT SHALL NOT BE USED FOR NATOPS CLOSED BOOK EXAMINATIONS OR FLIGHT EVALUATIONS

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FUNCTIONAL CHECKFLIGHTS.

Functional checkflights shall be performed when directed by, and in accordance with, OPNAVINST 4790.2 (series) and 3710.7 (series) and this manual, using the NAVAIR 01-75PAC-1F NATOPS functional checkflight checklist. In addition, the following general regulations shall apply:

1. Functional checkflights shall be flown with the minimum crew necessary to properly operate and evaluate the required equipment.

2. Aircraft shall be serviced with the minimum amount of fuel required, plus a proper reserve.

3. Flight duration shall be the minimum time necessary to check the required systems and equipment for operational use.

4. Flights shall be conducted within the local area.

5. Flights shall normally be conducted during daylight hours under VFR conditions.

FUNCTIONAL CHECKFLIGHT CREW.

The most important factor in obtaining good checkflights on the aircraft is to pick experienced and conscientious check crews. Persons conducting the checkflights shall be qualified to perform and evaluate the checks required. Functional checkflight pilots shall be those most qualified in type and the pilot in command shall be designated as a functional checkflight pilot in writing by the commanding officer.

AVIONICS CHECKFLIGHT (SENSOR STATION 3).

RADAR STABILIZATION CHECK.

The radar stabilization check is designed to determine correct operation of the antenna stabilization gyros, correct tilt alignment between forward and aft radars, and correct functioning of the antenna position programmer. Although this check is normally performed over water with surface targets of opportunity, it may be performed over land if suitable land targets are present.

Note

- Steps 1 through 12 are performed using INS-1.
- Steps 1 through 5 of this check apply to both of the search radar control panels C-7512/APS-115.

1. Press LOAD switch-indicator to ANT.

2. Press forward and aft HV switch-indicator to HV ON.

3. Set AFC-MAN toggle switch to MAN. Adjust MAN TUNE control for peak video display.

4. Set AFC-MAN toggle switch to AFC. Video level should remain approximately the same as in previous step.

5. Set forward and aft RVCR GAIN control for a balanced video return.

6. Set STAB-OUT switch to the OUT position.

7. Rotate TILT control through range of control. Check for normal indication.

8. Set STAB-OUT switch to the STAB position.

9. Rotate the TILT control for optimum presentation.

10. Check both radars for proper tilt alignment. (Refer to NAVAIR 01-75PAC-12-5, Section 4 for proper alignment procedure, if needed.)

11. Select small video targets near 0 and 180 degrees relative to the nose at approximately 40 miles and check that targets do not fade appreciably during 10 degree pitches.

12. Check that small video returns do not fade appreciably during 10 degree rolls.

Note

Coordinate with NAV/COMM operator for switching to INS-2 heading/attitude source.

13. Repeat steps 11 and 12 using INS-2.

Note

If video fades out during a maneuver, manual TILT control should be adjusted manually, synchronized with the maneuver, and the extremes of tilt control travel noted, to provide troubleshooting information for maintenance personnel. This check will define the amount of error. Stabilization checks should be made with the antenna SCAN switch set to FULL position. If tilt stabilization checks are made with the SCAN switch set to STOP position, slight adjustments of the ANT HEADING control may be necessary to prevent video loss. This adjustment would be considered normal.

ASQ-10A MAD CHECKS AND COMPENSATION.

The various MAD checks incorporated in the checkflight are designed to provide in-flight checks to validate the repair of previous MAD discrepancies and to determine the need for MAD compensation. If a MAD compensation is required, the appropriate data will be recorded on figures 3-13 thru 3-17. These forms shall be prepared locally and will be issued along with the NAVAIR 01-75PAC-1F checklist. These forms, along with the MAD tape will be turned in to ground personnel after the termination of the checkflight. The MAD tape shall be annotated with standard symbols as depicted in Section III, Part 5.

An operational figure of merit (OFOM) determination will indicate whether a fast perm trim or full term trim is required. If an original OFOM results in a value greater than 2.4 gamma, the operator should perform a fast perm trim followed by an additional OFOM. If the value of the second OFOM exceeds 2.4 gamma, a full term trim is required followed by an FOM.

1. ASQ-10A System Check.

a. MAD AUX switch (C-7693/ASA-71 MAD control panel) – POWER.

b. POWER-OFF switch (C-7718/ASA-65 compensator control) – POWER.

c. RO-32 TEST switch – OPR.

d. FUNCTION switch (C-2548/ASQ-10) – HTR REG. Residual field meter shall indicate between voltage check lines.

e. FUNCTION switch – B+. Meter shall indicate between voltage check lines.

f. FUNCTION switch – I SERVO and O SERVO. Meter shall read within voltage check lines for both functions. If necessary, adjust R-1622 and R-1620. MAD signal pen shall oscillate smoothly less than three major divisions. If necessary, adjust R-1623 and R-1624 on AM-1967 for minimum smooth pen oscillations.

g. Select proper pen inputs to recorder on the C-7693/ASA-71 MAD control panel.

h. FUNCTION switch (C-2548/ASQ-10A) – EFB.

i. Rotate earth field balance control CW to null the residual field meter pointer, then rotate CCW until meter pointer is within cancelled region positioned near the two L s in "CANCELLED," as indicated on the meter face.

j. FUNCTION switch – OR.

k. Adjust I ORIENT and O ORIENT controls individually to bring recorder pen orient signals to a minimum and less than three minor divisions; will usually adjust to one minor division. Lock controls.

l. FUNCTION switch to sense 1. System noise should ideally be less than 0.1 gamma (one major division). System should be checked if noise exceeds 0.15 gamma.

m. Perform SAD adjustment procedure if needed.

n. MAD orientation and EFB should be checked periodically.

2. Electrical/Electronic System Turn-on Procedures.

The following electronics and electrical systems are to be on or as noted during MAD performance/MAD compensation procedures.

a. PILOT STATION.

(1) ARC-101–ON (transmit only with sensor station 3 operator knowledge).

(2) ARC-143–ON (transmit only with sensor station 3 operator's knowledge).

(3) ARN-52 tacan–OFF.

(4) ARN-83 ADF–ON.

(5) APX-72 IFF–ON.

(6) ASA-66 pilot display–ON.

(7) APN-141/194 RAWS–ON.

(8) AJN-15 flight director–ON.

(9) PB-20N autopilot/ASW-31 in later aircraft–ON.

(10) Electric windshield wipers–OFF.

(11) Electric windshield heaters–ON.

(12) AIC-22 ICS–ON.

(13) Deicers–OFF.

(14) Exterior lights–ON (rotating beacon – OFF).

(15) Flight instruments – As required.

(16) Propeller and empennage anti-icers – OFF.

(17) ARA-50 OTPI–ON.

(18) APQ-107 RAWS–ON.

b. TACCO STATION.

(1) AYA-8 system (logic units, MTT*s, DMTU** keysets)–ON.

(2) ASQ-114 central computer–ON.

(3) ASA-70 MDDs/AROs–ON.

(4) All TACCO power control panel switches–ON.

c. NAV/COMM STATION.

(1) ARC-161–ON (transmit only with sensor station 3 operator's knowledge).

(2) ARC-143–ON (transmit only with sensor station 3 operator's knowledge).

(3) ASN-84s–ON.

(4) APN-187–ON.

(5) ARN-81–ON.

(6) AGC-6–ON.

(7) ACQ-5–ON.

(8) INTERFACE 1 (A363) – Circuit breaker in.

(9) INTERFACE 2 (A323) – Circuit breaker in.

d. SENSOR STATION 3.

(1) APS-115–ON (aft HV to STBY).

(2) APX-76–ON (not interrogating).

(3) ASA-64/71–ON.

(4) ALQ-78–ON.

*Aircraft BUNO 156507 through 161131, except 159889.
**Aircraft BUNO 159889, 161132 and subsequent.

e. SENSOR STATIONS 1 AND 2.

(1) ARR-72–ON.

(2) ASSG–OFF.

(3) AQH-4–ON.

(4) TD-900–ON.

(5) AQA-7–ON.

3. MAD Performance Checks.

a. OPERATIONAL FIGURE OF MERIT PROCEDURES.

(1) Aircraft at 200 KIAS.

(2) Altitude 15,000 feet or higher.

(3) ASA-65 POWER–ON, SERVO–OFF.

(4) ASQ-10A PWR–ON, sense 1 selected.

(5) RO-32 TEST switch–OPR.

(6) Ensure averages obtained during previous compensation or the factory averages are set in on the C-7718/ASA-65.

COUNTER SETTINGS FOR ASQ-10A EQUIPPED AIRCRAFT		
T 530	L 444	V 584
1. (LL) 250	2. (LV) 485	*3. (VV) 509
4. (tt) 580	5. (11) 935	6.(1v) 446

*Manually set the VV term to 509; this will minimize the roll-in/roll-out signals.

(7) Fly straight and level on any magnetic cardinal heading.

(8) On figure 3-17, record the average values in gammas of straight and level noise (SLN) seen on the RO-32 recorder.

Note

If the straight and level flight noise exceeds 0.15 gamma, peak-to-peak, a system discrepancy is indicated and an OFOM should not be attempted.

(9) Establish aircraft in 25-degree angle-of-bank turn for 380 degress.

(10) Engage rolls on maneuver programmer.

(11) Pilot should indicate, via the ICS, when the aircraft is passing through each intercardinal magnetic heading.

(12) Measure and record the average maneuver noise in the interval of ±20 degrees of each intercardinal heading. This corresponds to approximately one major division recorder travel above and one major division below the intercardinal heading mark.

(13) Sum the four values and record on figure 3-17. The maximum sum is 2.4 gamma. The maximum single component is 0.9 gamma.

b. FIGURE OF MERIT PROCEDURES.

(1) Aircraft at 200 KIAS.

(2) Altitude 15,000 or higher.

(3) ASA-65 POWER–ON, SERVO–OFF.

(4) ASQ-10A PWR–ON, sense 1 selected.

(5) Ensure averages obtained during compensation are set in on the C-7718/ASA-65.

(6) Fly straight and level on any magnetic cardinal heading.

(7) On figure 3-17, record the average values in gammas of straight and level noise (SLN) seen on the RO-32 recorder.

Note

If the straight and level flight noise exceeds 0.15 gamma, peak-to-peak, a system discrepancy is indicated and should be investigated.

(8) Remain on the same heading and perform a series of standard roll maneuvers. Record the average

value of the peak-to-peak roll and/or equipment noise in gammas.

(9) Perform a series of standard pitch maneuvers. Record the average value of the peak-to-peak pitch and/or equipment noise in gammas.

(10) Perform a series of standard yaw maneuvers. Record the average value of the peak-to-peak yaw and/or equipment noise in gammas.

STANDARD MANEUVERS

Maneuver	Amplitude	Period	Restrictions
Roll	±10°	4 to 8 sec	±1° Yaw
Yaw	± 5°	4 to 8 sec	±1° Roll
Pitch	± 3°	3 to 6 sec	50 feet maximum altitude change
Turn	360°	2 minutes	±1° variation of roll, 25 feet maximum altitude change

Note

Average heading during roll, yaw, and pitch maneuvers should be maintained within ±1 degree.

(11) Repeat steps (6) through (10) for each of the three remaining magnetic cardinal headings.

(12) Commence a standard rate turn (through 450 degrees) and mark the recorder trace when the aircraft begins roll-in, passes through cardinal heading and at roll-out.

(13) Determine and record the values in gammas, of the peak-to-peak recorder deflection and average noise for each quadrant.

(14) Add the values of maneuver noise from the FOM runs and record the total.

(15) If the FOM exceeds 2.4 gamma, a system discrepancy is indicated and should be investigated.

4. MAD Compensation Procedures.

a. FAST PERM TRIM PROCEDURES (DIP ANGLE ABOVE 45 DEGREES).

(1) Aircraft heading: north, MAG TERM to T, RATE to 3, +/– to +.

(2) Maneuver is 10-degree rolls. Allow T counter to run in. RATE switch to 2 and 1 to slow counter oscillations until a null is reached. No discernible in-phase maneuver is observed on recorder. Right wing mark should move towards the center of pen swing. Refer to figure 3-22.

(3) RATE switch to OFF, record T counter reading on chart (figure 3-13).

(4) Repeat steps (1), (2), and (3) for south heading. Record counter readings, figure average and set on T counter.

(5) Aircraft heading: east, MAG TERM to L, RATE to 3, +/– to +.

(6) Maneuver is 3-degree pitches. Allow L counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Record readings.

(7) Repeat steps (5) and (6) for west heading, record counter readings, figure average for L and set on L counter.

(8) Aircraft heading: east, MAG TERM to V, RATE switch to 2, +/– to + for V.

Note

The V-term potentiometer output is passed through a long time constant R-C filter. Therefore, do not use a RATE setting above 2 at any time during V compensation. When approaching optimum compensation, time must be allowed for the output coil current to build up to the counter setting.

(9) Maneuver is 10-degree rolls. Allow V counter to run in. RATE switch to 1 and slow counter oscillation until a null is reached. Record reading.

(10) Repeat steps (8) and (9) for west heading, +/– to +, record counter readings, figure average for V and set on V counter.

(11) Perform operational figure of merit.

b. FAST PERM TRIM PROCEDURES (DIP ANGLE BELOW 45 DEGREES).

(1) Aircraft heading: north, MAG TERM to T, RATE to 3, +/- to +.

(2) Maneuver is 10-degreee rolls (5-degree yaws if dip angle is 0 to 30 degrees). Allow T counter to run in. RATE switch to 2 to 1 to slow counter oscillation until a null is reached. No discernible in-phase maneuver is observed on recorder. Right wing mark (if rolls) should move towards the center of pen swing. Refer to figure 3-22.

(3) RATE switch to OFF. Record T counter reading on chart (figure 3-14).

(4) Repeat steps (1) through (3) for south heading. Record counter reading, figure average and set on T counter.

(5) Aircraft heading: east, MAG TERM to L, RATE to 2, +/- to +.

(6) Maneuver is 3-degree pitches. Allow L counter to run in. RATE switch to 1 and allow counters to slow until a null is reached. Refer to figure 3-14. Record readings.

(7) Repeat steps (5) and (6) for west heading, record counter readings, figure average, and set on L counter.

(8) Aircraft heading: east, MAG TERM to V, RATE switch to 2 and then to 1 to slow counter oscillation until a null is reached, +/- to +.

Note

The V-term potentiometer output is passed through a long time constant R-C filter. Therefore, do not use a RATE setting above 2 at any time during V compensation. When approaching optimum compensation, time must be allowed for the output coil current to build up to the counter setting.

(9) Maneuver is 10-degree rolls. Allow V counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Refer to figure 3-14. Record readings.

(10) Repeat steps (8) and (9) for west heading, +/- to +. Record average and set on V counter.

(11) Perform operational figure of merit.

c. FULL TERM TRIM PROCEDURES (DIP ANGLE ABOVE 45 DEGREES).

(1) Aircraft heading: north, MAG TERM to T, RATE to 3, +/- to +.

(2) Maneuver is 10-degree rolls. Allow T counter to run in. RATE switch to 2 and 1 to slow counter oscillations until a null is reached. No discernible in-phase maneuver is observed on recorder. Right wing mark should move towards the center of pen swing.

(3) RATE switch to OFF, record T counter reading on chart (figure 3-15).

(4) Repeat steps (1), (2), and (3) for south heading. Record counter readings, figure average and set on T counter.

(5) Aircraft heading: east, MAG TERM alternately to L and 6 (lv), RATE to 3, +/- to +.

(6) Maneuver is 3-degree pitches. Allow L and lv counters to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Record reading.

(7) Repeat steps (5) and (6) for west heading, record counter readings, figure average for L and lv terms and set on L and lv counters.

(8) Aircraft heading: east, MAG TERM alternately to V and 4 (tt), RATE switch to 2; +/- to + for V, - for tt.

Note

The V-term potentiometer output is passed through a long time constant R-C filter. Therefore, do not use a RATE setting above 2 at any time during V compensation. When approaching optimum compensation, time must be allowed for the output coil current to build up to the counter setting.

(9) Maneuver is 10-degree rolls. Allow V and tt counters to run in. RATE switch to 1 to slow counter oscillation until a null is reached. Record readings.

(10) Repeat steps (8) and (9) for west heading, +/- to + for V and tt; record counter readings, figure average for V and tt terms and set on V and tt counters.

(11) Aircraft heading: north, MAG TERM alternately to 1 (LL) and 5 (ll), RATE to 3, +/- to -.

(12) Maneuver is 3-degree pitches. Allow LL and ll counters to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Record readings.

(13) Repeat steps (11) and (12) for south heading, +/- to -, record counter readings, figure average for LL and 11 terms and set on LL and 11 counters.

Note

If LL counter settings on north and south heading differ by more than 20 divisions, proceed with the LV trim. If difference is less than 20 divisions, proceed with the figure of merit, leaving LV set to its original value.

(14) LV trim (if required).

(a) Aircraft heading sequentially on cardinal headings, MAG TERM to L, RATE to 2, +/- to +.

(b) Maneuver is 3-degree pitches. Allow L counter to run in. RATE switch to 1 and allow counter oscillation to slow until a null is reached. Record settings. Perform on all four cardinal headings.

(c) Add values of east and west pitches together and then add north and south pitches together. Enter on figure 3-15. Insert smallest of the totals below that of the largest, using left or right column as appropriate and calculate the difference.

(d) Multiply the value obtained by the multiplication coefficient obtained from figure 3-23.

Note

If the dip angle (Ø) and earth's field strength (He) of the local area are not known, refer to a current Total Earth Field Intensity and Dip Angle map of the area.

(e) Record product and add or subtract value (as indicated) from initial setting of LV. Adjust 2 (LV) counter to the value obtained.

(f) Aircraft heading to east or west, MAG TERM to L, RATE switch to 2, +/- to +.

(g) Maneuver is 3-degree pitches. Allow L counter to run in. RATE switch to 1 and allow counter oscillation to slow until a null is reached. Set L counter to the optimum value.

(15) Perform figure of merit.

d. FULL TERM TRIM PROCEDURES (DIP ANGLE BELOW 45 DEGREES).

(1) Aircraft heading: north, MAG TERM to T, RATE to 3, +/- to +.

(2) Maneuver is 10-degree rolls (5-degree yaws if dip angle is 0 to 30 degrees), allow T counter to run in, RATE switch is 2 and 1 to slow counter oscillation until a null is reached. No discernible in-phase maneuver is observed on recorder. Right wing mark (if rolls) should move towards the center of pen swing. Refer to figure 3-22.

(3) RATE switch to OFF. Record T counter reading on chart (figure 3-16).

(4) Repeat steps (1) through (3) for south heading. Record counter reading, figure average and set on T counter.

(5) Aircraft heading: east, MAG TERM alternately to L and 6 (lv), RATE to 2, +/- to +.

(6) Maneuver is 3-degree pitches. Allow L and lv counters to run in. RATE switch to 1 and allow counters to slow until a null is reached. Refer to figure 3-16. Record readings.

(7) Repeat steps (5) and (6) for west heading. Record counter readings, figure averages for the L and lv terms and set on L and lv counters.

(8) Aircraft heading: east, MAG TERM alternately to V and 4 (tt) , RATE switch to 2 and then to 1 to slow counter oscillation until a null is reached, +/- to + for V, - for tt.

Note

The V-term potentiometer output is passed through a long time constant R-C filter. Therefore, do not use a RATE setting above 2 at any time during V compensation. When approaching optimum compensation, time must be allowed for the output coil current to build up to the counter setting.

(9) Manevuer is 10-degree rolls. Allow V and tt counters to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Refer to figure 3-16. Record readings.

(10) Repeat steps (8) and (9) for west heading, +/- to + for V and tt. Record counter readings, figure average for V and tt terms and set on V and tt counters.

(11) Aircraft heading: north, MAG TERM alternately to 1 (LL) and 5 (ll), RATE to 3, +/- to +.

(12) Maneuver is 3-degree pitch. Allow LL and ll counters to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Record readings.

(13) Repeat steps (11) and (12) for south heading, +/- to -, record counter readings, figure average for LL and ll terms and set on LL and ll counters.

Note

If LL counter settings on north and south heading differ by more than 20 divisions, proceed with the LV trim. If difference is less than 20 divisions, proceed with the figure of merit, leaving LV set to its original value.

(14) LV trim (if required).

(a) Aircraft heading: east, MAG TERM to L, RATE to 3, +/- to +.

(b) Maneuver is 5-degree yaw. Allow L counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Record settings.

(c) Repeat steps (a) and (b) above for west heading. Record settings.

(d) Aircraft heading: north, MAG TERM to V, RATE to 2, +/- to +.

(e) Maneuver is 3-degree pitches. Allow V counter to run in. RATE switch to 1 to slow counter oscillation until a null is reached. Record settings.

(f) Repeat steps (d) and (e) above for south heading. Record settings.

(g) Add values of east and west yaws together and subtract the south pitch from the north. Enter on figure 3-16. Subtract 1000 from the EW sum and multiply the result times the multiplication coefficient from column 1 in figure 3-24. (Reverse the sign if southern dip angle used.) Algebraically add this value to the NS value and multiply result times the multiplication coefficient from column 3, figure 3-24. This new value is algebraically added to the original LV setting to determine the new 2 (LV) setting.

(h) Readjust L term as in steps (5) through (7) above.

(i) Readjust V term as in steps (8) through (10) above.

(15) Perform figure of merit.

ASQ-81 MAD CHECKS AND COMPENSATION.

The various MAD checks incorporated in the checkflight are designed to provide in-flight checks to validate the repair of previous MAD discrepancies and to determine the need for MAD compensation. If a MAD compensation is required, the appropriate data will be recorded on figures 3-17 thru 3-21. These forms shall be prepared locally and will be issued along with the NAVAIR 01-75PAC-1F checklist. These forms, along with the MAD tape will be turned in to ground personnel after the termination of the checkflight. The MAD tape shall be annotated with standard symbols as depicted in Section III, Part 5.

An operational figure of merit (OFOM) determination will indicate whether a fast perm trim or full term trim is required. If an original OFOM results in a value greater than 0.8 gamma, the operator should perform a fast perm trim followed by an additional OFOM. If the value of the second OFOM exceeds 0.8 gamma, a full term trim is required followed by an FOM.

1. ASQ-81 System Check.

a. SYS READY light—ON.

b. ALT COMP switch—ON.

c. Upper BANDPASS switch—0.6
Lower BANDPASS switch—0.04.

d. γFS switch—1.

e. RO-32 TEST switch—OPR.

f. Check noise level, 0.05 gamma (2½ minor divisions) during straight and level flight.

g. CAL OFF/ON toggle switch – ON.

h. Pen deflection should be six major divisions (if noise level is normal).

i. CAL switch—OFF.

j. ALT COMP—OFF.

k. RO-32 TEST switch—OFF.

2. Electrical/Electronic System Turn-on Procedures.

The following are to be on or as noted during MAD performance and MAD compensation procedures.

a. PILOT STATION.

(1) ARC-101—ON (transmit only with sensor station 3 operator knowledge).

(2) ARC-143—ON (transmit only with sensor station 3 operator knowledge).

(3) ARN-52 tacan—OFF.

(4) ARN-83 ADF—ON.

(5) APX-72 IFF—ON.

(6) ASA-66 pilot display—ON.

(7) APN-141/194 RAWS—ON.

(8) AJN-15 flight director—ON.

(9) PB-20N autopilot/ASW-31 in later aircraft—ON.

(10) Electric windshield wipers—OFF.

(11) Electric windshield heaters—ON.

(12) AIC-22 ICS—ON.

(13) Deicers—OFF.

(14) External lights—ON (anti-collision or strobe—OFF).

(15) Flight instruments—As required.

(16) Propeller and empennage anti-icers—OFF.

(17) ARA-50 OTPI—ON.

(18) APQ-107 RAWS—ON.

b. TACCO STATION.

(1) AYA-8 system (logic units, MTTs*, DMTU** keysets) – ON.

(2) ASQ-114 central computer—ON.

(3) ASA-70 MMDs/AROs—ON.

(4) All TACCO power control panel switches—ON.

(5) Radar scan—ON.

c. NAV/COMM STATION.

(1) ARC-161—ON (transmit only with sensor station 3 operator knowledge).

(2) ARC-143—ON (transmit only with sensor station 3 operator knowledge).

(3) ASN-84s—ON.

(4) APN-187—ON.

(5) ARN-81—ON.

(6) ARN-99—ON.

(7) AGC-6—ON.

(8) ACQ-5—ON.

(9) INTERFACE 1 (A363) – Circuit breakers in.

(10) INTERFACE 2 (A323) – Circuit breakers in.

d. SENSOR STATION 3.

(1) APS-115—ON (aft HV to STBY).

(2) APX-76—ON.

(3) ASA-64/71—ON.

(4) AAS-36—ON.

(5) ASQ-78—ON.

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*Aircraft BUNO 156507 through 161131, except 159889.
**Aircraft BUNO 159889, 161132 and subsequent.

e. SENSOR STATIONS 1 AND 2.

(1) ARR-72–ON.

(2) ASSG–OFF.

(3) AQH-4–ON.

(4) TD-900–ON.

(5) AQA-7–ON.

(6) ASA-66–ON.*

f. AFT STATION/GALLEY.

(1) Lavatory lights–OFF.

(2) Overhead lights–OFF.

(3) Coffee pot, utility outlets, hot cups–OFF.

(4) Galley and ARM ORD station ICS SPKR/PHONES–PHONES.

3. MAD Performance Checks

a. OPERATIONAL FIGURE OF MERIT PROCEDURES.

(1) Aircraft at 200 KIAS.

(2) Altitude 15,000 feet or higher.

(3) ASA-65 POWER–ON, SERVO–OFF.

(4) ASQ-81 PWR–ON, γFS–1, UBP–0.6, LBP–0.06, ALT COMP–ON.

(5) RO-32 TEST switch–OPR.

(6) Ensure averages obtained during previous compensation or the factory averages are set in on the C-8935/ASA-65.

(7) Fly straight and level on any magnetic cardinal heading.

(8) On figure 3-17, record the average values in gammas of straight and level flight noise seen on the RO-32 recorder.

*Aircraft BUNO 158928, 159503 and subsequent.

COUNTER SETTINGS FOR ASQ-81 EQUIPPED AIRCRAFT		
T	L	V
525	390	590
1. (1v)	2. (tt)	3. (LL)
465	555	280
4. (ll)	5. (v1)	*6. (VV)
725	465	490

*6 (VV) term shall be set manually to 490 to minimize roll-in/roll-out signals.

(9) Establish aircraft in 25-degree angle-of-bank turn for 380 degrees.

(10) Engage rolls on maneuver programmer.

(11) Pilot should indicate, via the ICS, when the aircraft is passing through each intercardinal magnetic heading.

(12) Measure and record the average maneuver noise in the interval of ±20 degrees of each intercardinal heading; this corresponds to approximately one major division recorder travel above and one major division below the intercardinal heading mark.

(13) Sum the four values and record in figure 3-17. The maximum sum is 0.8 gamma. The maximum single component is 0.3 gamma.

b. FIGURE OF MERIT PROCEDURES.

(1) Aircraft at 200 KIAS.

(2) Altitude 15,000 or higher.

(3) ASA-65 POWER-ON, SERVO–OFF.

(4) ASQ-81 PWR–ON, γFS–1, UBP–0.6, LBP–0.06, CAL–OFF, ALT COMP–ON.

(5) Ensure averages obtained during compensation are set in on the C-8935/ASA-65.

(6) Fly straight and level on any magnetic cardinal heading.

(7) On figure 3-17, record the average values in gammas of straight and level noise seen on the RO-32 recorder.

Note

If the straight and level flight noise exceeds 0.05 gamma, peak-to-peak, a system discrepancy is indicated and should be investigated. An OFOM should not be attempted.

(8) Remain on the same heading and perform a series of standard roll maneuvers. Record the average value of the peak-to-peak roll and/or equipment noise in gammas.

(9) Perform a series of standard pitch maneuvers. Record the average value of the peak-to-peak pitch and/or equipment noise in gammas.

(10) Perform a series of standard yaw maneuvers. Record the average value of the peak-to-peak yaw and/or equipment noise in gammas.

(11) Repeat steps (6) through (10) for each of the three remaining cardinal headings.

(12) Commence a standard rate turn (through 450 degrees) and mark the recorder trace when the aircraft begins roll in, passes through cardinal heading, and at roll out.

(13) Determine and record the values, in gammas, of the peak-to-peak recorder deflection and average noise for each quadrant.

(14) Add the values of maneuver noise from the FOM runs and record the total.

(15) If the FOM exceeds 1.25, a system discrepancy is indicated and should be investigated.

4. MAD Compensation Procedures.

a. FAST PERM TRIM PROCEDURES (DIP ANGLE ABOVE 45 DEGREES).

Note

Ensure ALT COMP is OFF.

(1) Aircraft heading: north, MAG TERM to T, RATE to 3, +/- to +.

(2) Maneuver is 10-degree rolls. Allow T counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached.

(3) Record T counter reading on chart (figure 3-18).

(4) Repeat steps (1) through (3) above for south heading. Figure average of T readings and set on T counter. Record average on chart.

(5) Aircraft heading: east, MAG TERM to L, RATE to 3, +/- to +.

(6) Maneuver is 5-degree yaws. Allow L counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Record readings on chart (figure 3-18).

(7) Repeat steps (5) and (6) for west heading, record counter reading, figure average for L term and set on L counter.

(8) Aircraft heading: east, MAG TERM to V, RATE to 3, +/- to +.

Note

The V-term potentiometer output is passed through a long time constant R-C filter. Therefore, do not use RATE setting above 2 at any time during V compensation. When approaching optimum compensation, time must be allowed for the output coil current to build up to the counter setting.

(9) Maneuver is 10-degree rolls. Allow V counter to oscillate until a null is reached. Record readings.

(10) Repeat steps (8) and (9) for west heading, +/- to +, record counter readings, figure average for V term, and set on V counter.

(11) Perform operational figure of merit.

b. FAST PERM TRIM PROCEDURES (DIP ANGLE BELOW 45 DEGREES).

Note

Ensure ALT COMP is OFF.

(1) Aircraft heading: north, MAG TERM to T, RATE to 3, +/- to +.

(2) Maneuver is 10-degree rolls (5-degree yaws if dip angle is from 0 to 30 degrees). Allow T counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Refer to figure 3-19.

(3) RATE switch to OFF, record T counter reading on chart (figure 3-19).

(4) Repeat steps (1) through (3) for south heading. Record counter reading, figure average and set on T counter.

(5) Aircraft heading: east, MAG TERM to L, RATE to 3, +/- to +.

(6) Maneuver is 5-degree yaws. Allow L counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Record reading.

(7) Repeat steps (5) and (6) for west heading, record counter readings, figure average for L term and set on L counter.

(8) Aircraft heading: east, MAG TERM to V, RATE to 3, +/- 0 to +.

Note

The V-term potentiometer output is passed through a long time constant R-C filter. Therefore, do not use a rate setting above 2 at any time during V compensation. When approaching optimum compensation, time must be allowed for the output coil current to build up to the counter setting.

(9) Maneuver is 10-degree rolls. Allow V counter run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Record readings.

(10) Repeat steps (8) and (9) for west heading +/- to +, record counter reading, figure average for V, and set on V counter.

(11) Perform operational figure of merit.

c. FULL TERM TRIM PROCEDURES (DIP ANGLE ABOVE 45 DEGREES).

Note

Ensure ALT COMP is OFF until adjustment is specified.

(1) Aircraft heading: north, MAG TERM to T, RATE to 3, +/- to +.

(2) Maneuver is 10-degree rolls. Allow T counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached.

(3) Record T counter reading on chart (figure 3-20).

(4) Repeat steps (1) through (3) above for south heading. Figure average of T readings and set on T counter. Record average on chart.

(5) Aircraft heading: east MAG TERM alternately to L and 1 (lv), RATE to 3, +/- to +.

(6) Maneuver is 5-degree yaws. Allow L and lv counters to run in. Rate switch to 2 and 1 to slow counter oscillation until a null is reached. Record readings.

(7) Repeat steps (5) and (6) for west heading, record counter reading, figure average for L term and set on L counter.

(8) Turn ALT COMP to ON.

(9) Aircraft heading: east, MAG TERM to 1 (lv), RATE to 3, +/- to +.

(10) Maneuver is 3-degree pitches. Alternately compensate 1 (lv) and ALT COMP (manual potentiometer). Record counter readout and ALT COMP potentiometer setting.

(11) Repeat steps (9) and (10) for west heading, record counter reading and potentiometer setting, figure average and set on lv counter and potentiometer setting, figure average and set on lv counter and potentiomenter.

(12) Aircraft heading: east, MAG TERM alternately to V and 2 (tt), RATE to 3, +/- to +.

Note

The V-term potentiometer output is passed through a long time constant R-C filter. Therefore, do not use RATE setting above 2 at any time during V compensation. When approaching optimum compensation, time must be allowed for the ouput coil current to build up to the counter setting.

(13) Maneuver is 10-degree rolls. Allow V and tt counters to run in. RATE switch to 1 to slow counter oscillation until a null is reached. Record reading.

(14) Repeat steps (12) and (13) for west heading, +/- to + for V, - for tt, record counter readings, figure average for V and tt terms, and set V and tt counters.

(15) Aircraft heading: north, MAG TERM alternately to 3 (LL) and 4 (ll) RATE to 3, +/- to +.

(16) Maneuver is 3-degree pitches. Allow LL and ll counters to run in. Rate switch to 2 and 1 to slow counter oscillation until a null is reached. Record readings.

(17) Repeat steps (15) and (16) for south heading, +/- to -, record counter readings, figure average for LL and ll terms and set on LL and ll counters.

Note

If ll counter settings on north and south headings differ by more than 20 divisions, proceed with the vl trim. If difference is less than 20 divisions, proceed with the figure of merit, leaving vl set to its original value.

(18) vl trim (if required).

(a) Aircraft heading: north or south, MAG TERM to 5 (vl), RATE to 3, +/- to +.

(b) Maneuvers are 3-degree pitches. Allow vl counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached, record reading and set on 5 (vl) counter.

(19) Perform figure of merit.

(20) After compensation and FOM procedures, determine ALT COMP correction factor for low level operation and set value on ALT COMP potentiometer.

ALTITUDE CORRECTION FACTOR (ASQ-81)	
Comp Altitude	Multiply ALT COMP Setting by
10,000 feet	0.7
15,000 feet	0.57
20,000 feet	0.47

d. FULL TERM TRIM PROCEDURES (DIP ANGLE BELOW 45 DEGREES).

Note

Ensure ALT COMP is OFF until adjustment is specified.

(1) Aircraft heading: north, MAG TERM to T, RATE to 3, +/- to +.

(2) Maneuver is 10-degree rolls (5-degree yaws if dip angle is 0 to 30 degrees). Allow T counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Refer to figure 3-21.

(3) RATE switch to OFF, record T counter reading on chart (figure 3-21).

(4) Repeat steps (1) through (3) for south heading. Record counter reading, figure average and set on T counter.

(5) Aircraft heading: east, MAG TERM alternately to L and l (lv), RATE to 3, +/- to +.

(6) Maneuver is 5-degree yaws. Allow L and lv counters to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Refer to figure 3-21. Record reading.

(7) Repeat steps (5) and (6) for west heading, record counter readings, figure averages for the L and lv terms and set on L and lv counters.

(8) Turn ALT COMP to ON.

(9) Aircraft heading: west, MAG TERM to l (lv), RATE to 3, +/- to +.

(10) Maneuver is 3-degree pitches. Alternately compensate l (lv) and ALT COMP (manual potentiometer). Record counter readout and ALT COMP potentiometer setting. Refer to figure 3-21.

(11) Repeat steps (9) and (10) for east heading, record counter reading and potentiometer setting, figure average and set on lv counter and potentiometer.

(12) Aircraft heading: east, MAG TERM alternately to V and 2 (tt), RATE to 3, +/- to +.

Note

The V-term potentiometer output is passed through a long time constant R-C filter. Therefore, do not use a RATE setting above 2 at any time during V compensation. When approaching optimum compensation, time must be allowed for the output coil current to build up to the counter setting.

(13) Maneuver is 10-degree rolls. Allow V and tt counters to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Refer to figure 3-21. Record readings.

(14) Repeat steps (12) and (13) for west heading, +/- to + for V, - for tt, record counter readings, figure average for V and tt terms, and set on V and tt counters.

(15) Aircraft heading: north, MAG TERM alternately to 3 (LL) and 4 (ll), RATE to 3, +/- to -.

(16) Maneuver is 3-degree pitches. Allow LL and ll counters to run in. RATE switches to 2 and 1 to slow counter oscillation until a null is reached. Refer to figure 3-21. Record readings.

(17) Repeat steps (15) and (16) for south heading, +/- to -, record counter readings, figure average for LL and ll terms and set on LL and ll counters.

Note

If ll counter settings on north and south headings differ by more than 20 divisions, proceed with the vl trim. If difference is less than 20 divisions, proceed with the figure of merit, leaving vl set to its original value.

(18) vl trim (if required).

(a) Aircraft heading: north or south, MAG TERM to 5 (vl), RATE to 3, +/- to +.

(b) Maneuvers are 3-degree pitches. Allow vl counter to run in. RATE switch to 2 and 1 to slow counter oscillation until a null is reached. Record reading and set on vl counter.

(19) Perform figure of merit.

(20) After compensation and FOM procedures, determine ALT COMP correction factor for low level operation and set value on ALT COMP potentiometer.

ALTITUDE CORRECTION FACTOR (ASQ-81)	
Comp altitude	Multiply ALT COMP setting by
10,000 feet	0.7
15,000 feet	0.57
20,000 feet	0.47

CGA COMPENSATION.

COMPENSATION MANEUVERS.

The four MAD compensation maneuver techniques are as follows:

1. Standard FOM square (cardinal/intercardinal headings). The aircraft assumes the first of four cardinal/intercardinal headings and begins a set of four standard rolls, four pitches, and four yaws using the maneuver programmer with as little delay as practicable between maneuver sets. Immediately upon completion of the last maneuver set, change the aircraft direction 90 degrees to the next cardinal/intercardinal heading and repeat maneuver series. Repeat the procedure to complete the headings forming a square.

2. Half-Standard FOM Square (cardinal/intercardinal headings). The aircraft assumes the first of four cardinal/intercardinal headings and begins a set of four half-standard yaws, four pitches, and four rolls. Half-standard maneuvers are pilot flown and will be executed independent of the maneuver programmer. Immediately upon completion of the last maneuver set, change the aircraft's direction 90 degrees to the next cardinal/intercardinal heading and repeat maneuver series. Repeat procedure to complete four headings forming a square.

3. Minimum Maneuvers FOM Square (cardinal, intercardinal headings and standard amplitudes). The aircraft assumes the first of four headings and begins a set of four rolls and four pitches of the desired amplitude using the MAD maneuver programmer. Immediately upon completion of the last maneuver set, change aircraft direction 90 degrees to the next desired heading and repeat maneuvers. Repeat procedure to complete four headings to form a square.

4. Two Heading Standard "L". The aircraft assumes the first of two desired headings and begins a set of four rolls, four pitches, and four yaws using the maneuver programmer with as little delay as practicable between maneuver sets. Immediately upon completion of the last

maneuver set, change aircraft direction 90 degrees to the next cardinal/intercardinal heading and repeat the maneuver series. This will complete the pattern.

The amplitude of maneuvers to be performed during each compensation procedures is presented below.

MAD Maneuver Amplitudes			
	Standard FOM	Half-Standard FOM	Minimum FOM
Roll	10°	5°	10° or 5°
Pitch	3°	1.5°	3° or 1.5°
Yaw	5°	2.5°	

CONTROLS AND INDICATORS, FUNCTIONAL DESCRIPTION.

The interrelationship of all controls and indicators is as follows:

If a system failure is detected, the amber indicator is reset, the FAULT indicator is illuminated, and fault code appears on the LED display. An operation failure is indicated by a flashing FAULT indicator. Reselection of the MODE switch resets the FAULT indicator.

Pressing EXEC when the MODE switch is in either the COMP or W/D positions illuminates the EXEC indicator through an amber filter and initiates a 10-minute time-limited compensation program.

Repressing EXEC switch prior to the 10-minute time limit halts the data gathering program and commands the computer to calculate the terms from the data collected, and then the EXEC illumination is extinguished.

If the compensation update or weapon deployment programs are not manually interrupted they will run to the 10-minute limit at which time data gathering is automatically halted. The sequence described in paragraph above will then take place.

Repeated pressing of the EXEC pushbutton with the MODE selector in any other position than COMP, W/D, Trim, or CAL will not reset the indicator and has no effect on the computer operation.

While the EXEC pushbutton is illuminated amber the display is inhibited.

Upon completion of either compensation function, each term position of the MODE switch will command the computer to activate the indicating display indicating the calculated value and polarity of the selected term. The display and EXEC indicator are extinguished in the OFF position of the MODE switch.

MAD COMPENSATION PROCEDURES (ASA-65 ONLY).

The following operating data contains reference information and operating instructions for performing compensation functions. It details preflight and in-flight procedures for operating the equipment before compensation, using MAD system controls as necessary, and describes those compensation procedures which are needed.

There is no specific requirement to compensate the aircraft's magnetic fields periodically. However, the compensation will slowly degrade due to changes in the airframe permament magnetism.

In order to obtain maximum MAD operational readiness, a CGA compensation should be conducted on every ASW flight. In addition, a CGA compensation must be conducted whenever MK-46 torpedoes are up or downloaded or whenever any of the following items are changed:

- C-8935/ASA-65* Compensator Control
- AM-6459/ASA-65* Amplifier Power Supply
- DT-355/ASA-65* Magnetometer
- MX-8897/ASA-65* Coil Assembly
- Major Airframe Components
- Engines
- Weapons

Magnetic compensation is achieved manually or semiautomatically using the CGA (compensator group adapter). Semiautomatic compensation includes mathematically computing difference values and applying those values to the appropriate magnetic term in the magnetic compensator control. Manual compensation is achieved without the CGA and includes manual input of term values during aircraft maneuvers.

COMPENSATOR GROUP ADAPTER CHECKS.

NEW

Set PWR-OFF switch on CGA magnetic field indicator to PWR.

BITE Check.

1. Set MODE switch to BITE. EXEC indicator illuminates green.

*Aircraft BUNO 156514, 157332 and subsequent (ASQ-81).

2. Press EXEC.

3. If no fault is detected, DISPLAY reads -888.8.

BITE Error Codes.

The BITE error codes are presented in order of decreasing priority. The BITE tests the CGA, the ASA-65 system, and checks for the presence of a proper signal from the ASQ-81. The BITE display readout is a four-digit number which points to the failed WRA (weapons replaceable assembly) and in most cases isolates the problem down to the failed SRA (shop replaceable assembly). The WRAs are coded as follows:

WRA	BITE Code Series
No faults detected	-8888
ASQ-81 Signal	7000
CGA Magnetic Field Indicator	6000
CGA Computer/Power Supply	5000
ASA-65 Output Coil Assembly	4000
ASA-65 Magnetometer Assembly	3000
ASA-65 Amp/Power Supply	2000
ASA-65 Compensator Control	1000
Priority Codes that are checked with a continuous BITE	00

The second and third digits indicate the PCB (printed circuit board) number(s) within the failed WRA that has the problem. The fourth digit serves to identify a specific failure on the PCB. For example, the BITE error code:

2 6 7 2

Indicates

2 — Fault lies with the ASA-65 amp/power supply

6 — Fault is contained on either PCB number 6 or 7.

7

2 — Indicates it is the second priority fault that can occur on either PCB 6 or 7.

A complete prioritized list of BITE codes is shown in figure 3-25.

The continuous BITE codes are listed below.

CONTINUOUS BITE			
Type	Fault	Fault Indicator	Display
1.	+15V, +28V 9.TC Failure ±15V, +5V CGA Failure Sync Fail BITE Request Failure	Steady	—
2.	Illegal Aircraft I/D	Steady	0001
	Illegal Mode Switch	Steady	0002
	Illegal OP-Code	Steady	0003
	All Output Coils Saturated	Steady	0004
	He Not Within Spec	Steady	0005
	Illegal Micro-Instruction	Steady	0006
3.	Larmor Too Low	Flashing	0010
	All MAD Saturated	Flashing	0020
	Singular Matrix	Flashing	0030
	Solution Too Big	Flashing	0040
	Floating Point Overflow	Flashing	0050
	Overflow In Digital Filters	Flashing	0060

Advisory Lamp and Computer Check.

1. Set MODE switch to COMP. EXEC indicator illuminates green.

2. Press EXEC once. EXEC indicator illuminates amber.

3. Repress EXEC switch after 15 seconds.

The EXEC indicator automatically extinguishes after a few seconds. The fault light may flash on and off and a failure code 0040 will appear indicating solution too big because no maneuvering was done. This is normal; if it occurs move mode switch out of COMP and back to COMP, then repress EXEC and wait 1 to 2 minutes, then press EXEC switch. If fault light does not come on go to COMP Program Check.

COMP Program Check.

1. Set MODE switch to T.

2. Press EXEC. A value will be indicated on the TERM ADJUST display.

3. Repeat the above procedure for all term positions of the MODE switch.

4. Set the MODE to OFF. The display and EXEC indicators are off.

SAD PERFORMANCE CHECK.

The SAD performance check is designed to determine correct functioning of the ASA-64 SAD system.

1. ASQ-10A/ASQ-81 MAD compensation complete, RO-32 TEST switch to OPR, sense 1 selected.

2. Aft radar ON, HV to STANDBY.

3. With aircraft at 500 feet, request pilot to fly over targets of opportunity. SAD will mark, INHIBIT light will illuminate for 9 seconds and a 1000 Hz tone will be heard in headset at sensor station 3.

TRUE AIRSPEED COMPUTER CHECK.

1. Set baro altimeter to 29.92 inches Hg.

2. Perform TAS checks utilizing the MB-9 computer to compute actual TAS at the following airspeeds:

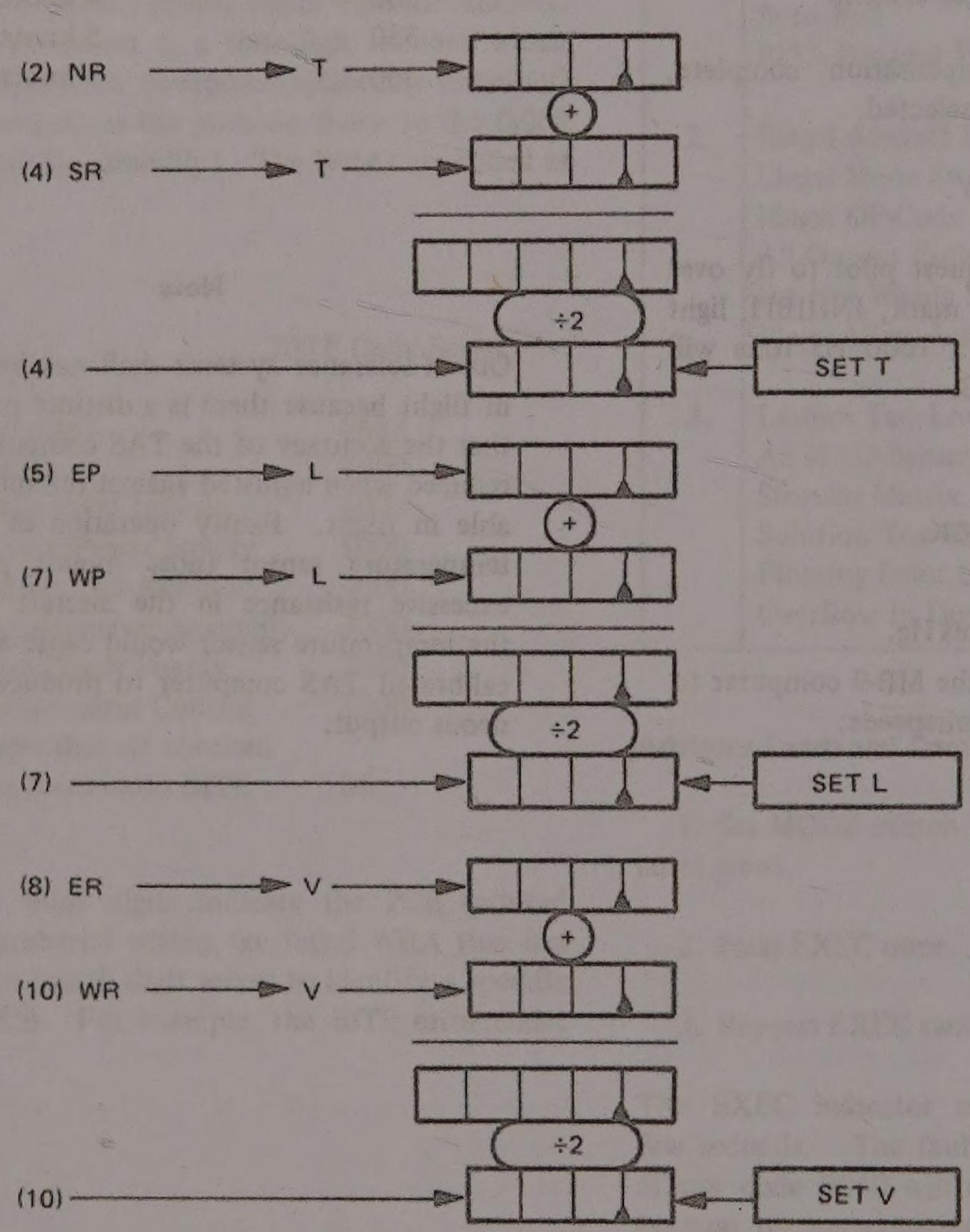
TAS	TOLERANCE
150	3 knots
180	3 knots
210	3 knots
240	4 knots
270	4 knots
300	4 knots
330	5 knots
360	5 knots

Note

Out-of-tolerance systems shall not be adjusted in flight because there is a distinct probability that the accuracy of the TAS computer will be reduced when adjusted against references available in flight. Faulty operation of the total temperature sensor (nose mount probe) or excessive resistance in the aircraft wiring to the temperature sensor would cause a properly calibrated TAS computer to produce an erroneous output.

P3-C/ASQ-10A FAST PERM TRIM RECORD AND CALCULATION SHEET FOR DIP ANGLE ABOVE 45 DEGREES

BUNO	DATE:	NAME	REMARKS:
COMPENSATION RECORD		FAST PERM TRIM	



NOTE: +/– SWITCH SHOULD BE LEFT IN + POSITION

NR/SR	–	NORTH OR SOUTH ROLLS
NP/SP	–	NORTH OR SOUTH PITCHES
EP/WP	–	EAST OR WEST PITCHES
ER/WR	–	EAST OR WEST ROLLS

FACTORY AVERAGES

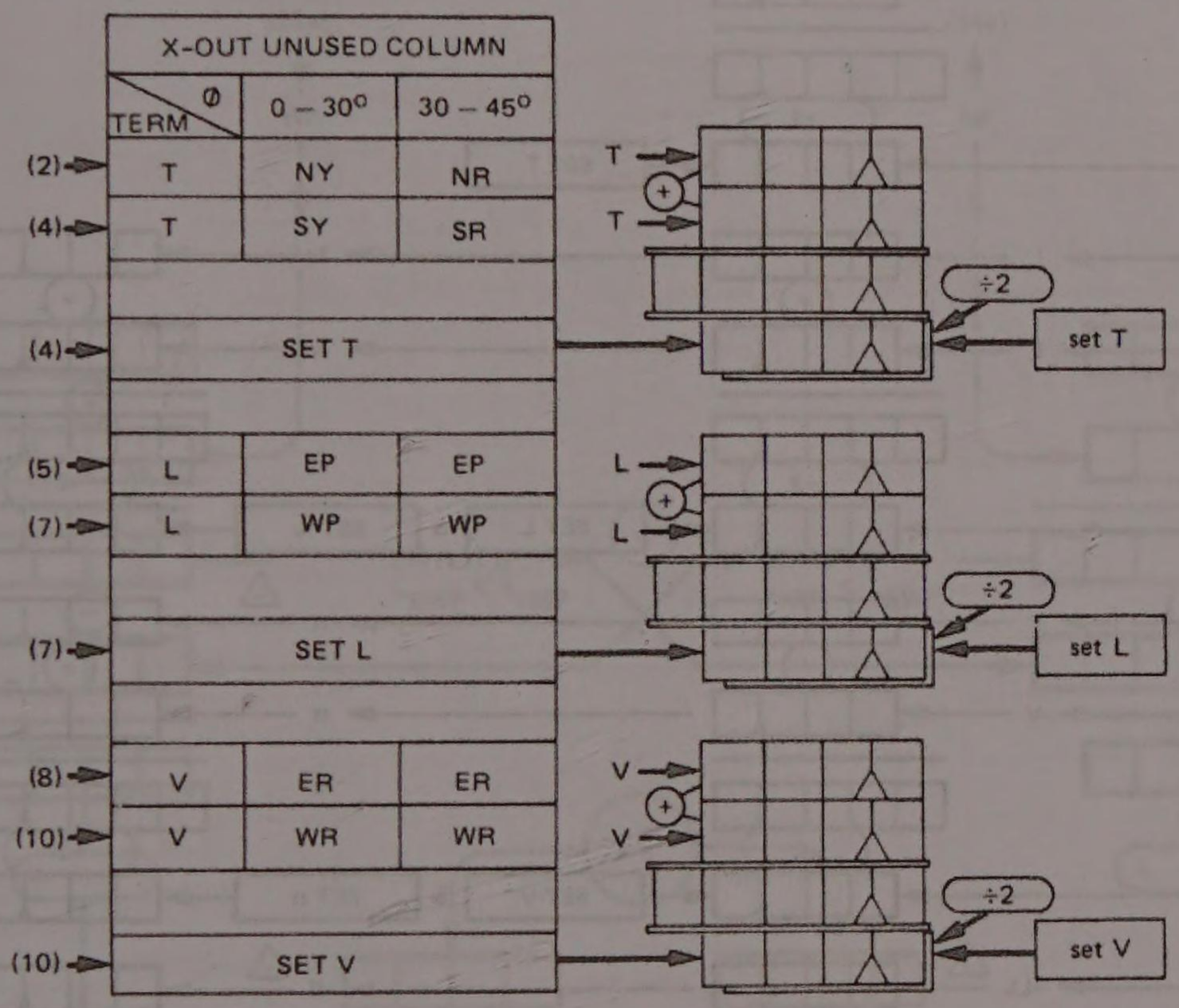
T	530	1	250	4	580
L	444	2	485	5	935
V	584	3	509	6	446

PAC-1.1(C2)0139

Figure 3-13. P-3C/ASQ-10A Fast Perm Trim Record and Calculation Sheet for Dip Angles Above 45 Degrees

P3-C/ASQ-10A FAST PERM TRIM RECORD AND CALCULATION SHEET FOR DIP ANGLE BELOW 45 DEGREES

BUNO	DATE:	NAME	REMARKS:
AREA:		He Oe. Ø °	



(11) PERFORM OFOM.

NR/SR – NORTH OR SOUTH ROLLS
NP/SP – NORTH OR SOUTH PITCHES
EP/WP – EAST OR WEST PITCHES
ER/WR – EAST OR WEST ROLLS

FACTORY AVERAGES

T	530	1	250	4	580
L	444	2	485	5	935
V	584	3	509	6	446

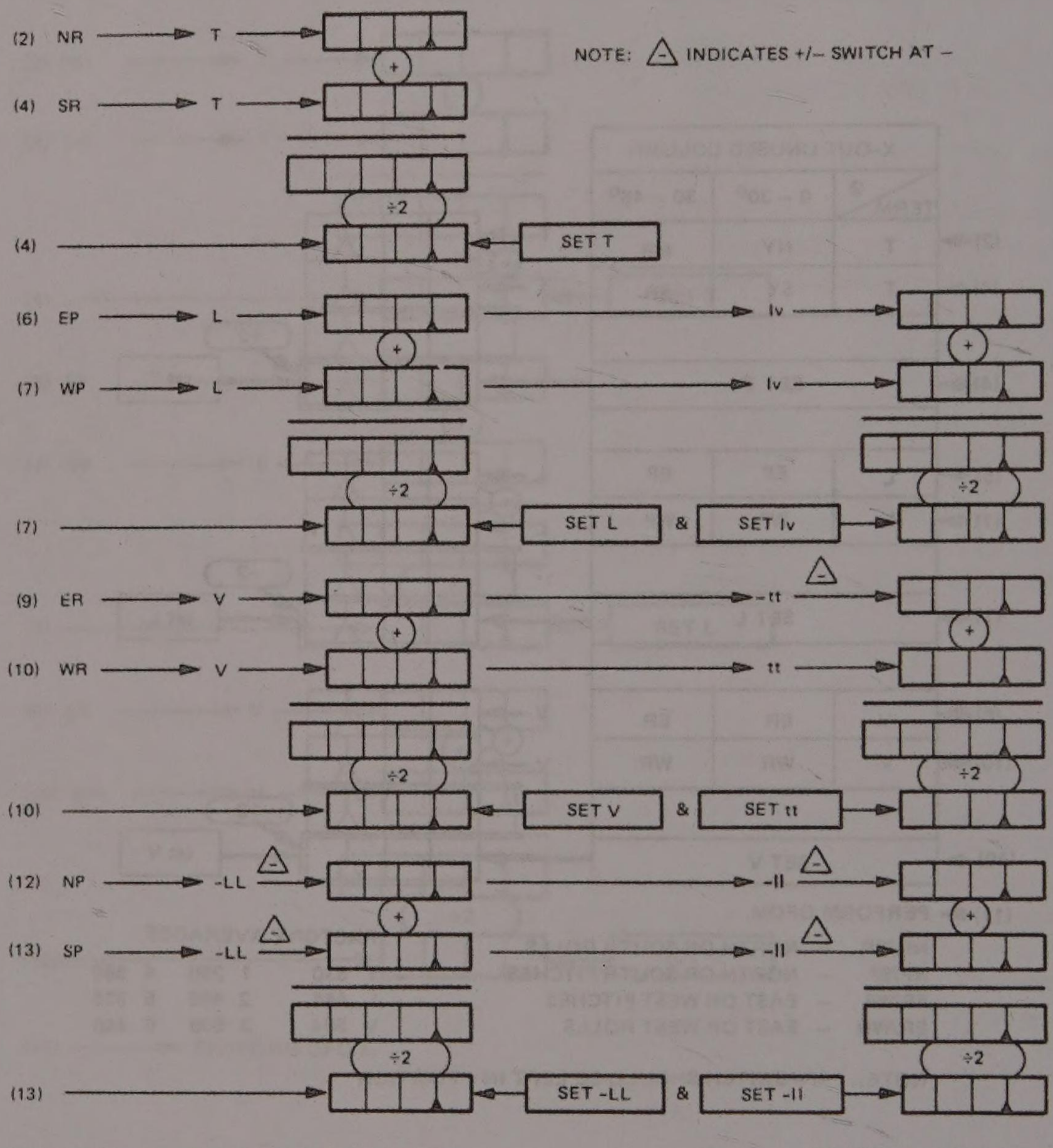
NOTE: +/– SWITCH SHOULD BE LEFT IN + POSITION

PAC-1.1(C2)0140

Figure 3-14. P-3C/ASQ-10A Fast Perm Trim Record and Calculation Sheet for Dip Angles Below 45 Degrees

P3-C/ASQ-10A FULL TERM TRIM RECORD AND CALCULATION SHEET FOR DIP ANGLE ABOVE 45 DEGREES

BUNO	DATE:	NAME	REMARKS:
COMPENSATION RECORD		FULL TERM TRIM	



(14) PERFORM LV TRIM (SHEET 2) IF REQUIRED

(15) PERFORM FIGURE OF MERIT

NR/SR – NORTH OR SOUTH ROLLS
NP/SP – NORTH OR SOUTH PITCHES
EP/WP – EAST OR WEST PITCHES
ER/WR – EAST OR WEST ROLLS

FACTORY AVERAGES

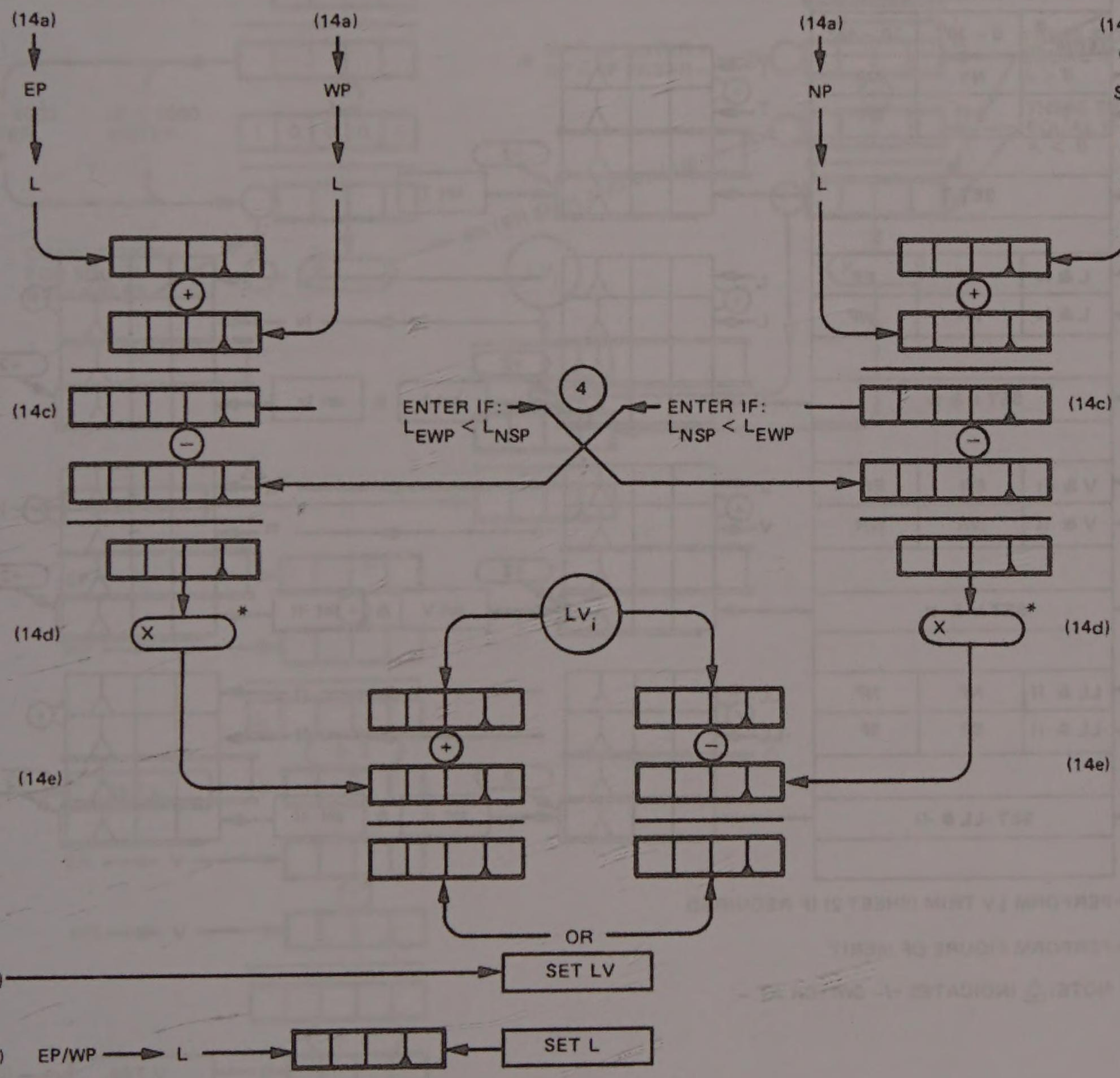
T	530	1	250	4	580
L	444	2	485	5	935
V	584	3	509	6	446

PAC-1.1(C2)0018

Figure 3-15. P-3C/ASQ-10A Full Term Trim Record and Calculation Sheet for Dip Angle Above 45 Degrees (Sheet 1 of 2)

P3-C/ASQ-10A FULL TERM TRIM RECORD AND CALCULATION SHEET FOR DIP ANGLE ABOVE 45 DEGREES

BUNO	DATE:	NAME	REMARKS:
COMPENSATION RECORD		LV TRIM	
AREA:	He	Oe Ø	°



* INDICATES THAT ACTUAL VALUE OF MULTIPLIER IS TO BE OBTAINED FROM FIGURE 3-22, AS APPROPRIATE, USING GEOMAGNETIC MAP COVERING COMPENSATION AREA.

PAC-1.1(C2)0019

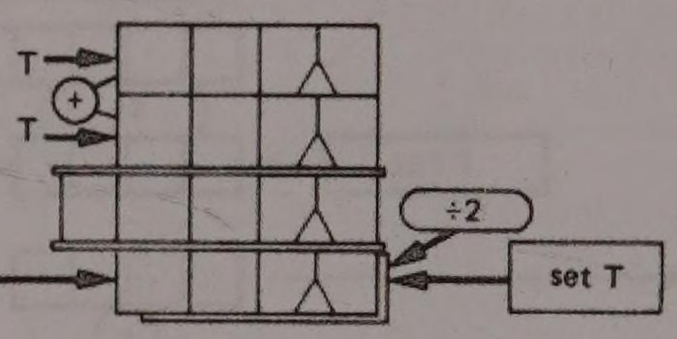
Figure 3-15. P-3C/ASQ-10A Full Term Trim Record and Calculation Sheet for Dip Angle Above 45 Degrees (Sheet 2 of 2)

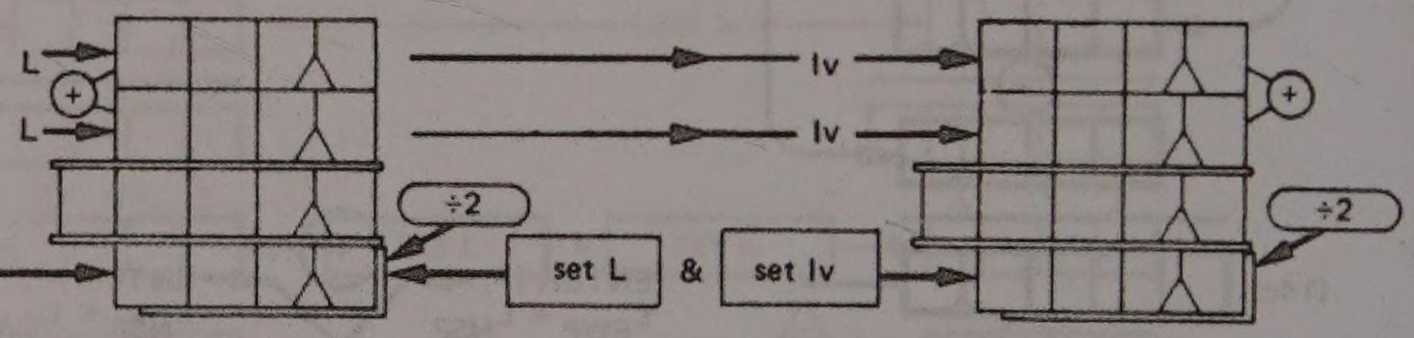
P3-C/ASQ-10A FULL TERM TRIM RECORD AND CALCULATION SHEET FOR DIP ANGLE BELOW 45 DEGREES

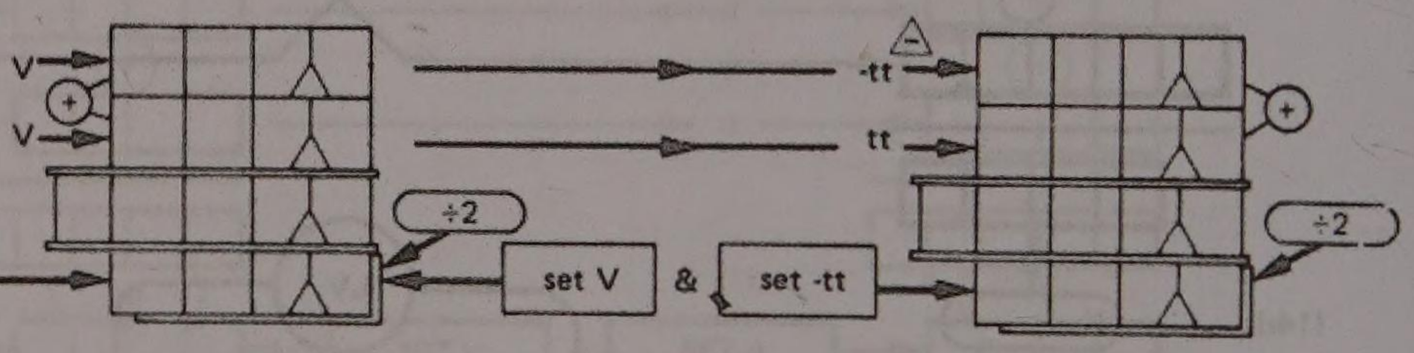
BUNO	DATE:	NAME	REMARKS:
AREA:		He Oe. Ø °	

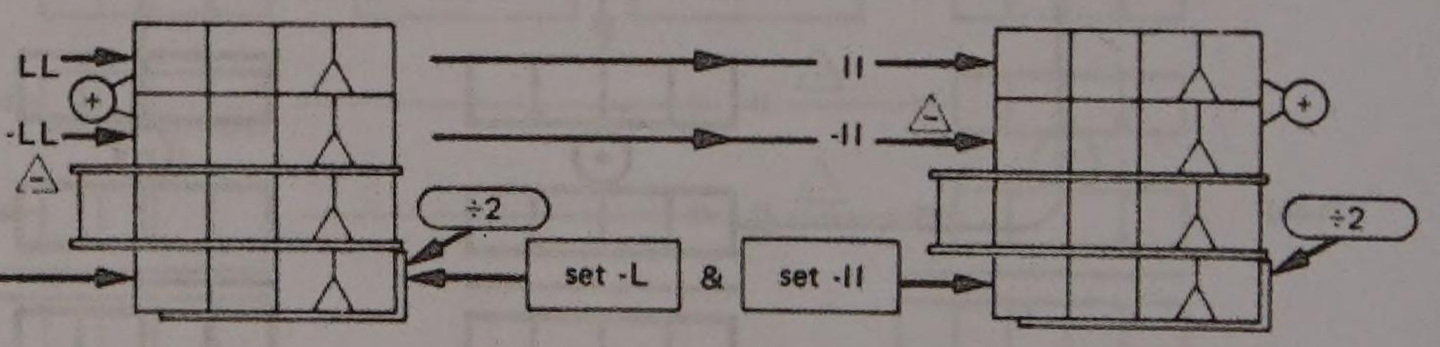
X-OUT UNUSED COLUMN

TERM \ Ø	0 – 30°	30 – 45°
(2) → T	NY	NR
(4) → T	SY	SR
(4) → SET T		
(6) → L & Iv	EP	EP
(7) → L & Iv	WP	WP
(7) → SET L & Iv		
(9) → V & -tt	ER	ER
(10) → V & tt	WR	WR
(10) → SET V & -tt		
(12) → LL & II	NP	NP
(13) → -LL & -II	SP	SP
(13) → SET -LL & -II		









(14) → PERFORM LV TRIM (SHEET 2) IF REQUIRED

(15) → PERFORM FIGURE OF MERIT

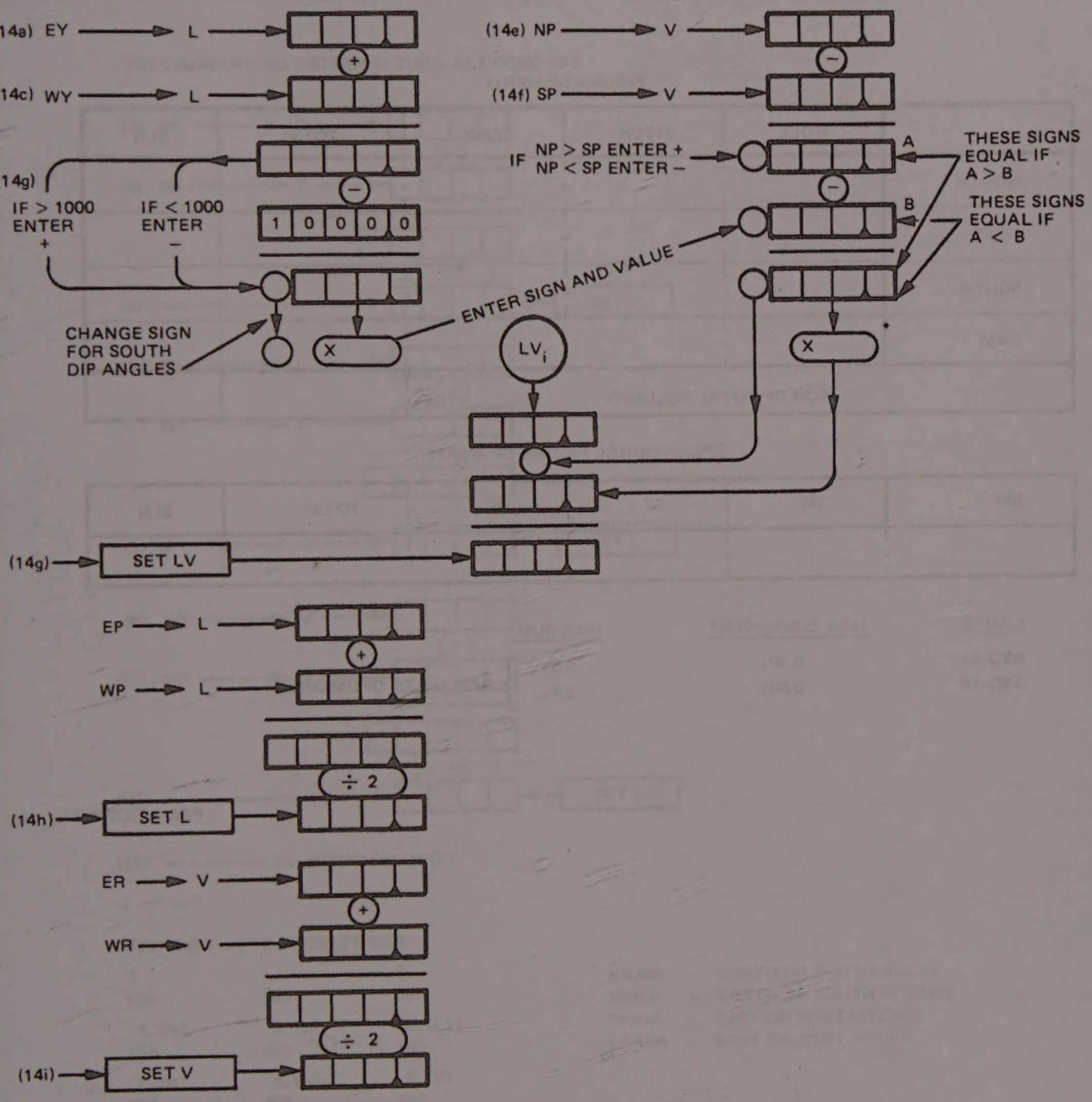
NOTE: △ INDICATES +/– SWITCH AT –

PAC-1.1(C2)0020

Figure 3-16. P-3C/ASQ-10A Full Term Trim Record and Calculation Sheet for Dip Angle Below 45 Degrees (Sheet 1 of 2)

P3-C/ASQ-10A FULL TERM TRIM RECORD AND CALCULATION SHEET FOR DIP ANGLE BELOW 45 DEGREES

BUNO	DATE:	NAME	REMARKS:
AREA:		He Oe. Ø o	



* ACTUAL VALUE OF MULTIPLIER IS TO BE OBTAINED FROM FIGURE 3-23, AS APPROPRIATE, USING GEOMAGNETIC MAP COVERING COMPENSATION AREA.

PAC-1.1(C2)0021

Figure 3-16. P-3C/ASQ-10A Full Term Trim Record and Calculation Sheet for Dip Angle Below 45 Degrees (Sheet 2 of 2)

FIGURE OF MERIT RECORD AND CALCULATION SHEET

FIGURE OF MERIT

	ROLL		PITCH		YAW		TOTAL	SLN
NORTH		+		+		=		
WEST		+		+		=		
SOUTH		+		+		=		
EAST		+		+		=		
(SUM OF TOTAL COLUMN)					FOM	=		

OPERATIONAL FIGURE OF MERIT

NW		NE		SE		SW		TOTAL	SLN
	+		+		+		=		

LIMITS	MAX COMPONENT	MAX SUM	
ASQ-81	0.30γ	0.8γ	} APPLIES TO OFOM ONLY
ASQ-10	0.90γ	2.4γ	

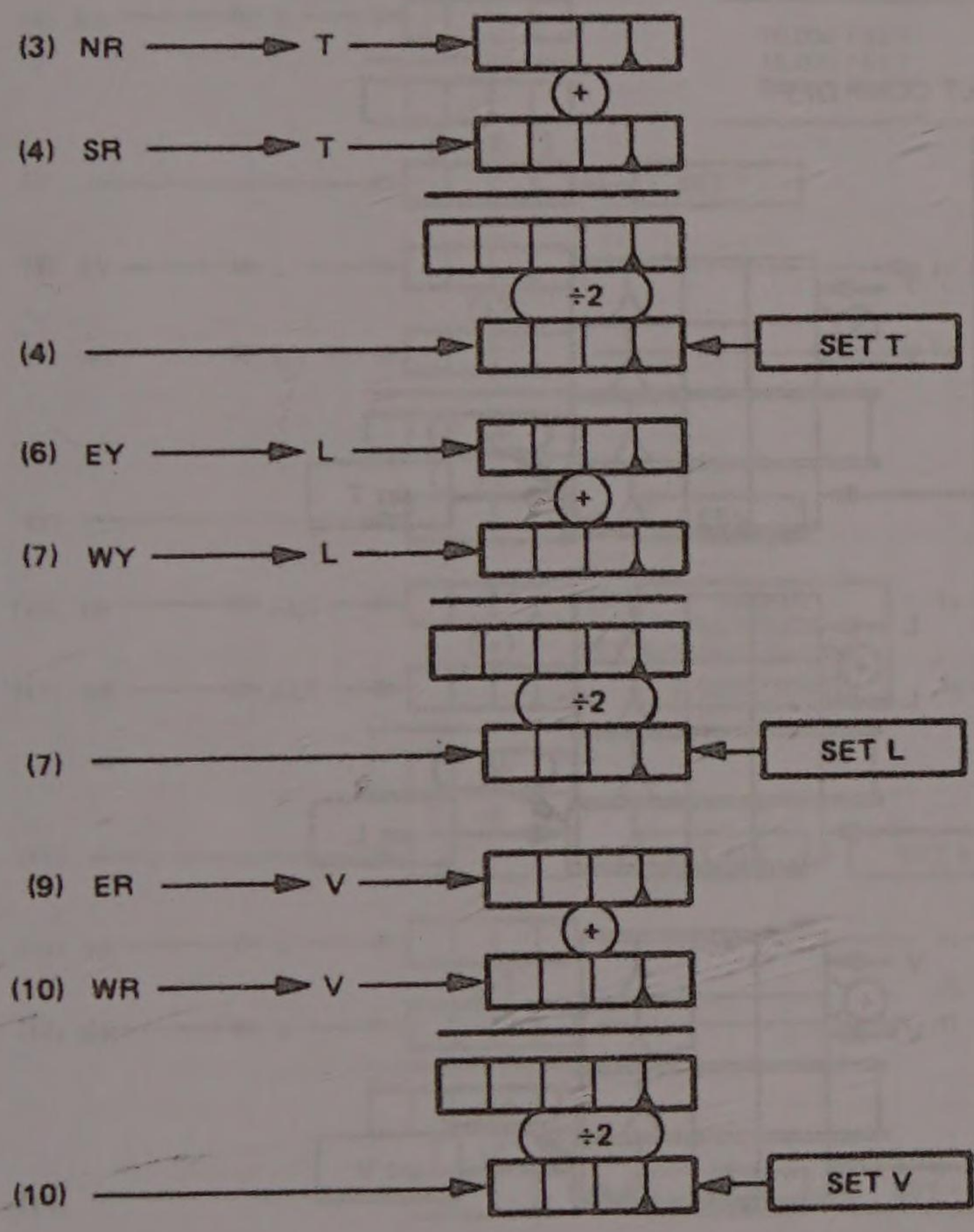
PAC-1.1(C2)0141

Figure 3-17. Figure of Merit Record and Calculation Sheet

P3-C/ASQ-81 FAST PERM TRIM RECORD AND CALCULATION SHEET FOR DIP ANGLE ABOVE 45 DEGREES

BUNO	DATE:	NAME	COMP ALTITUDE:
COMPENSATION RECORD		FULL TRIM	

PRELIMINARY ADJUSTMENT: TURN ALT COMP OFF



FACTORY AVERAGE SETTINGS

T	L	V
525	390	590
1. (Iv)	2. (tt)	3. (LL)
455	555	280
4. (II)	5. (vI)	6. (V)
725	465	490

NR/SR – NORTH OR SOUTH ROLLS
NP/SP – NORTH OR SOUTH PITCHES
EP/WP – EAST OR WEST PITCHES
ER/WR – EAST OR WEST ROLLS

PAC-1.1(C2)0142

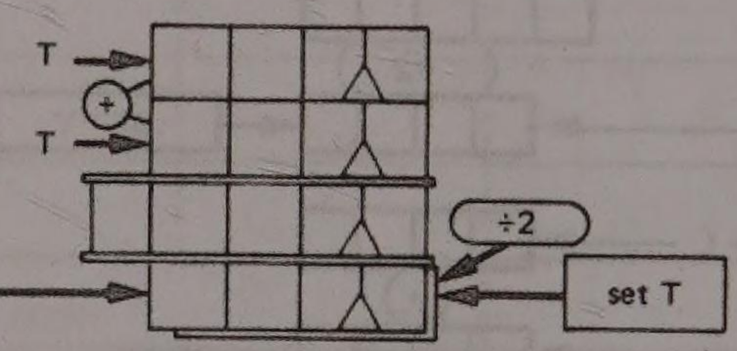
Figure 3-18. P-3C/ASQ-81 Fast Perm Trim Record and Calculation Sheet for Dip Angle Above 45 Degrees

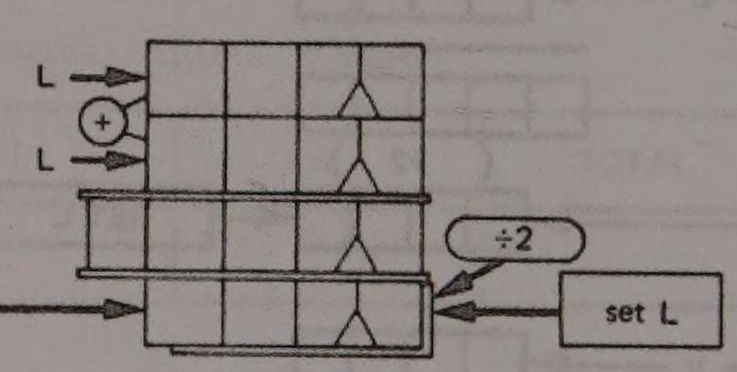
P3-C/ASQ-81 FAST PERM TRIM RECORD AND CALCULATION SHEET FOR DIP ANGLE BELOW 45 DEGREES

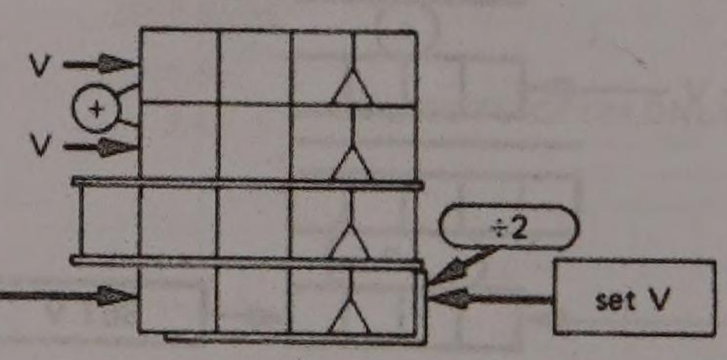
BUNO	DATE:	NAME	REMARKS:
AREA:	He	Oe. Ø °	COMP ALTITUDE:

PRELIMINARY ADJUSTMENT: TURN ALT COMP OFF

	X-OUT UNUSED COLUMN		
	TERM \ Ø	0 – 30°	30 – 45°
(1) →	T	NY	NR
(4) →	T	SY	SR
(4) →	SET T		
(5) →	L	EY	EY
(7) →	L	WY	WY
(7) →	SET L		
(8) →	V	ER	ER
(10) →	V	WR	WR
(10) →	SET V		







(11) → PERFORM OFOM.

FACTORY AVERAGE SETTINGS

T	L	V
525	390	590

1. (lv)	2. (tt)	3. (LL)
455	555	280

4. (ll)	5. (vl)	6. (VV)
725	465	490

NR/SR – NORTH OR SOUTH ROLLS
NP/SP – NORTH OR SOUTH PITCHES
EP/WP – EAST OR WEST PITCHES
ER/WR – EAST OR WEST ROLLS

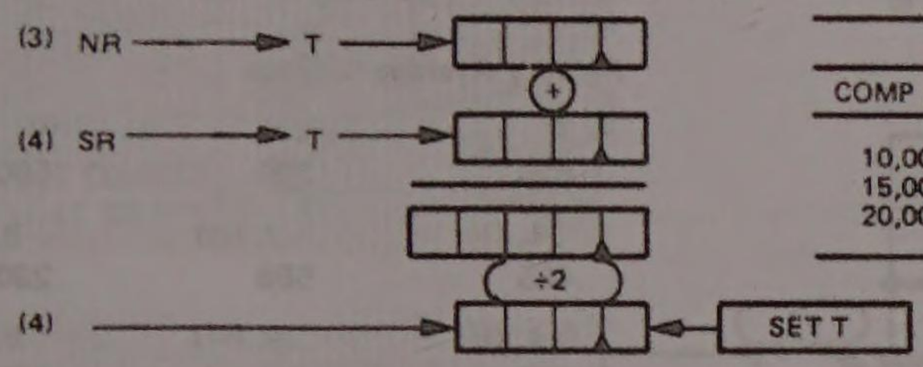
PAC-1.1(C2)0143

Figure 3-19. P-3C/ASQ-81 Fast Perm Trim Record and Calculation Sheet for Dip Angle Below 45 Degrees

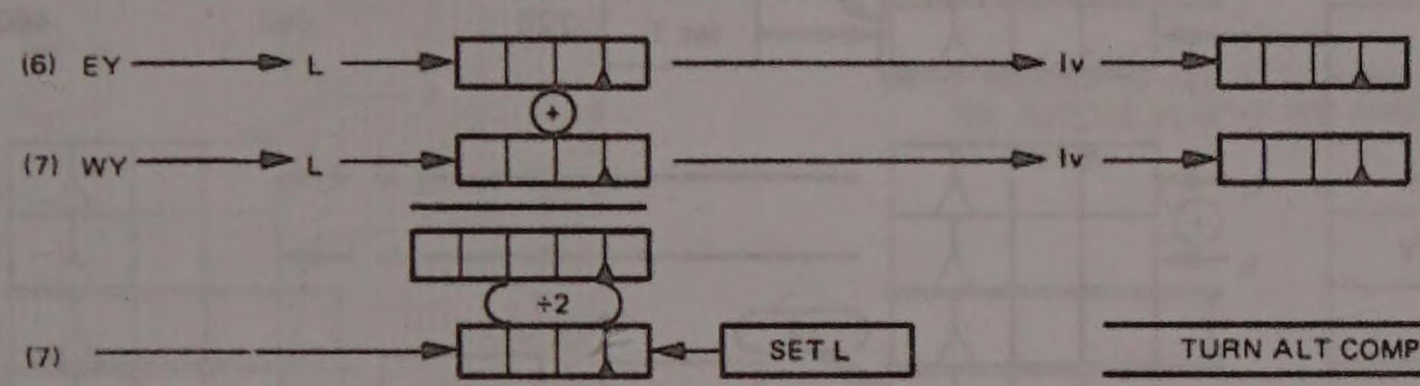
P3-C/ASQ-81 FULL TERM TRIM RECORD AND CALCULATION SHEET FOR DIP ANGLE ABOVE 45 DEGREES

BUNO	DATE:	NAME	COMP ALTITUDE:
COMPENSATION RECORD		FULL TRIM	

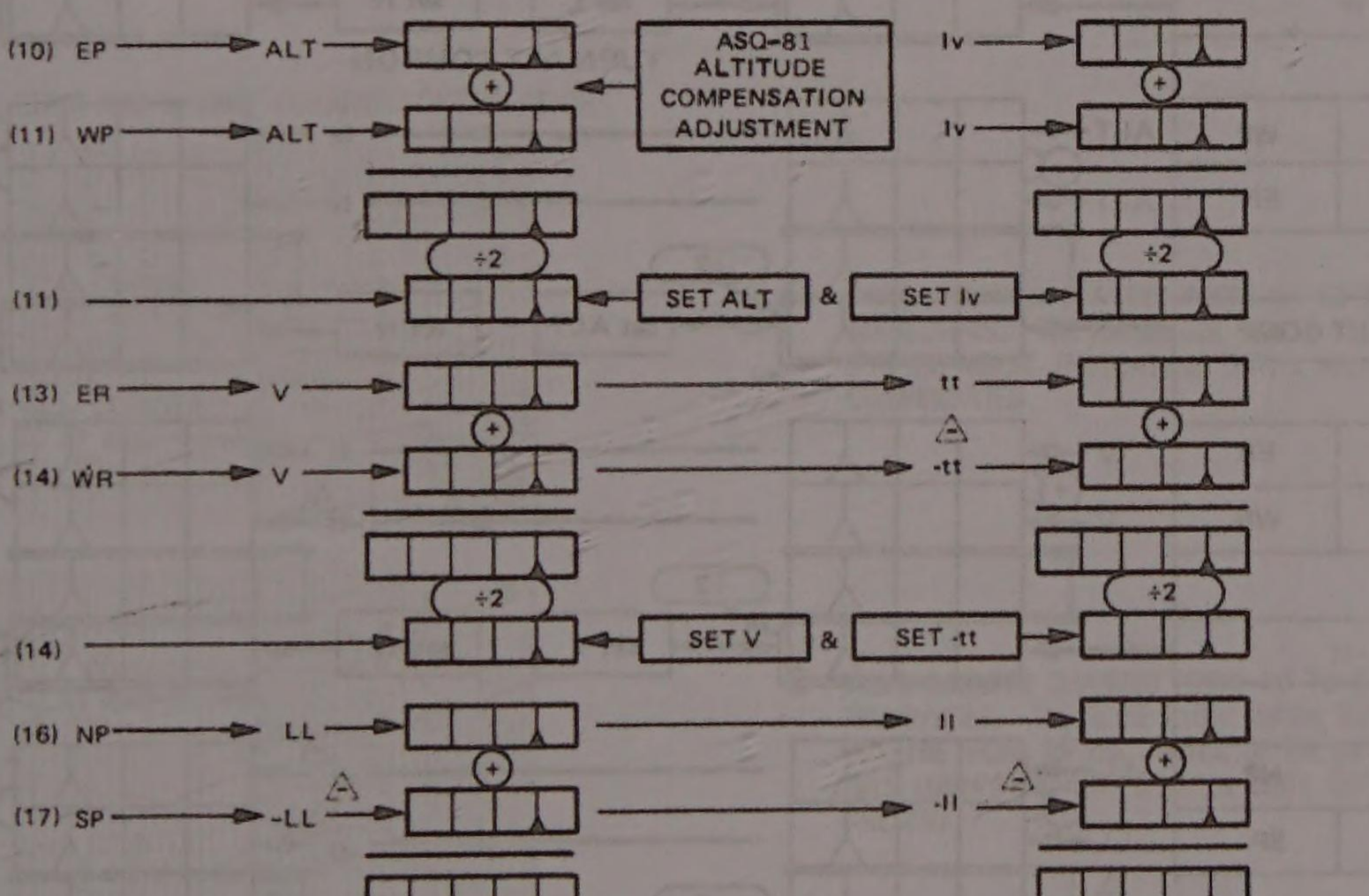
PRELIMINARY ADJUSTMENT: TURN ALT COMP OFF



ALTITUDE CORRECTION FACTOR	
COMP ALTITUDE	X ALT COMP BY:
10,000 FEET	0.7
15,000 FEET	0.57
20,000 FEET	0.47



TURN ALT COMP ON



FACTORY AVERAGE SETTINGS

T	L	V
525	390	590
1. (lv)	2. (tt)	3. (LL)
465	555	280
4. (ll)	5. (vl)	6. (VV)
725	465	490

PAC-1.1(C2)0022

Figure 3-20. P-3C/ASQ-81 Full Term Trim Record and Calculation Sheet for Dip Angle Above 45 Degrees

P3-C/ASQ-81 FULL TERM TRIM RECORD AND CALCULATION SHEET FOR DIP ANGLE BELOW 45 DEGREES

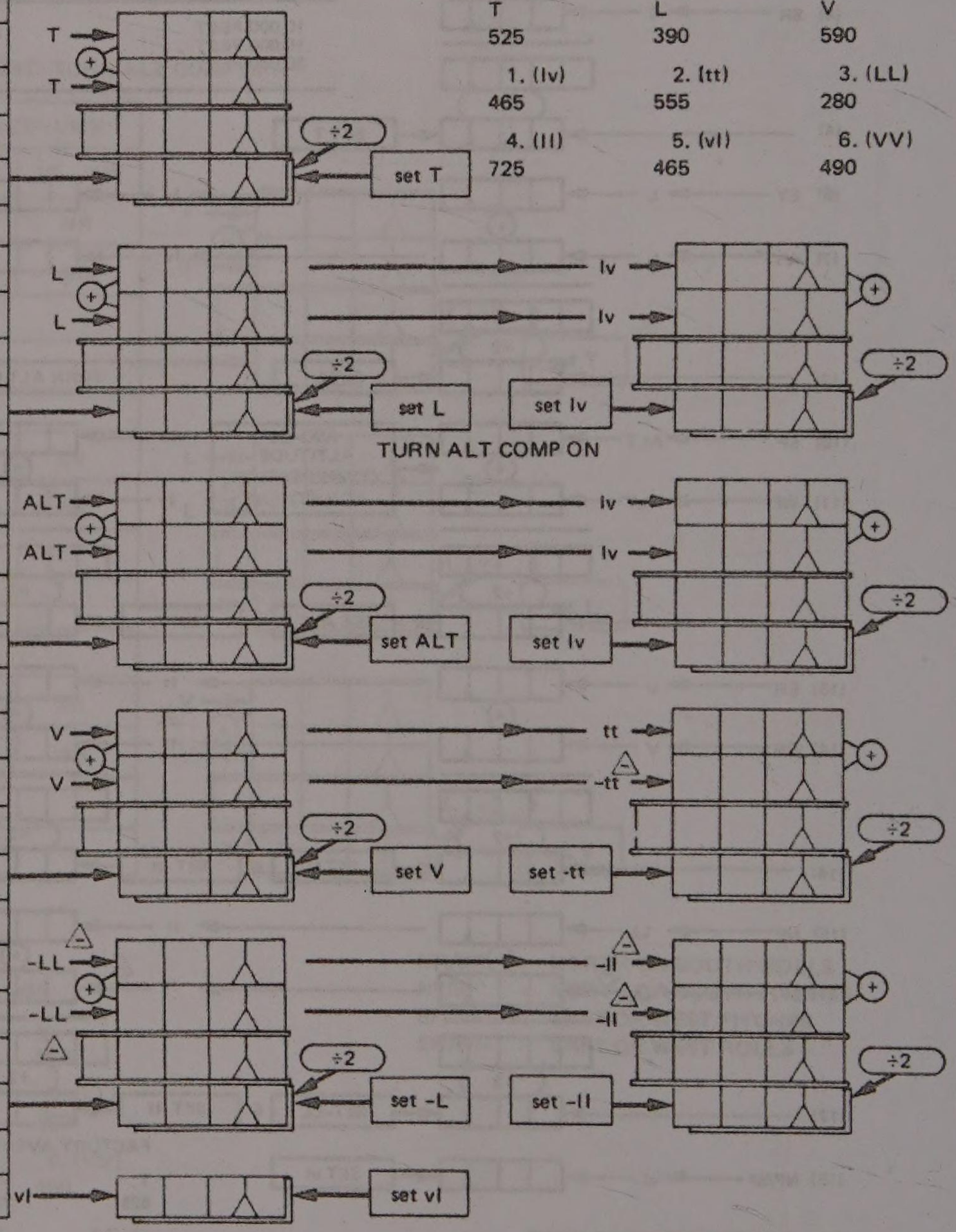
BUNO	DATE:	NAME	REMARKS:
AREA:	He	Oe. Ø °	COMP ALTITUDE:

NARY ADJUSTMENT: TURN ALT COMP OFF

	X-OUT UNUSED COLUMN		
	Ø / TERM	0 – 30°	30 – 45°
(1)	T	NY	NR
(4)	T	SY	SR
(4)	SET T		
(5)	L & Iv	EY	EY
(7)	L & Iv	WY	WY
(7)	SET L & Iv		
(9)	ALT	WP	WP
(11)	ALT	EP	EP
(11)	SET ASQ-81 ALT COMP		
(12)	V & tt	ER	ER
(14)	V & -tt	WR	WR
(14)	SET V & -tt		
(15)	-LL & -ll	NP	NP
(17)	-LL & -ll	SP	SP
(17)	SET - LL & ll		
(18)	vl	NP/SP	NP/SP

Factory Average Settings

T	L	V
525	390	590
1. (Iv)	2. (tt)	3. (LL)
465	555	280
4. (ll)	5. (vl)	6. (VV)
725	465	490



(19) PERFORM FIGURE OF MERIT

(20) APPLY CORRECTION FACTOR TO ALT COMP

ALT COMP SET →

NOTE: △ INDICATES +/– SWITCH AT –

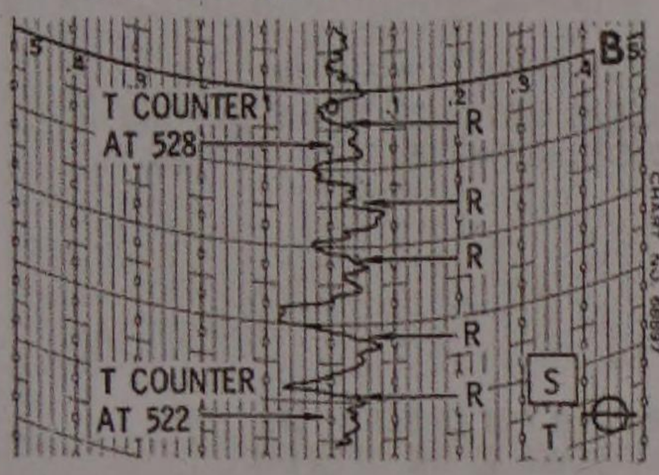
PAC-1.1(C2)0023

Figure 3-21. P-3C/ASQ-81 Full Term Trim Record and Calculation Sheet for Dip Angle Below 45 Degrees

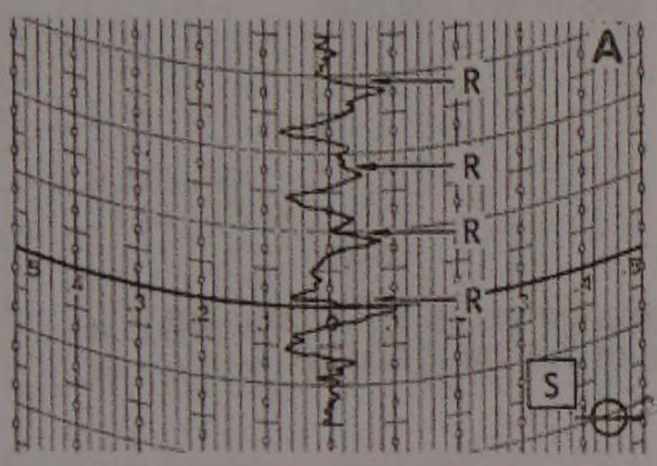
TYPICAL MAD COMPENSATION

THESE EXAMPLES ARE FOR AN/ASQ 81 MAD SYSTEM ON THE 1 GAMMA SCALE. AN/ASQ 10 MAD COMPENSATION WILL LOOK THE SAME EXCEPT THE SYSTEM NOISE AND MANEUVER SIGNALS WILL BE LARGER.

I. T PERM COMPENSATION

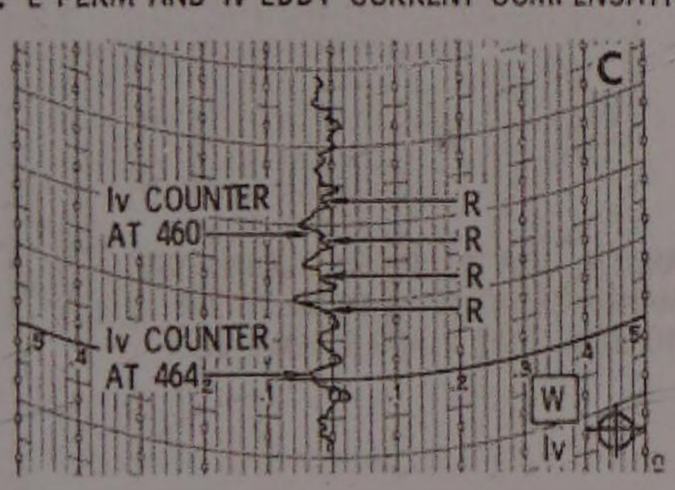


B THE T COUNTER CHANGED FROM 522 TO 528 DURING THE MANEUVERS. THE RIGHT WING MARK MOVED FROM THE OUTSIDE PEAK TO THE CENTER OF THE MANEUVER. THIS INDICATES THAT NO T PERM IS LEFT. THERE COULD BE SOME EDDY CURRENT LEFT BUT IT CANNOT BE COMPENSATED

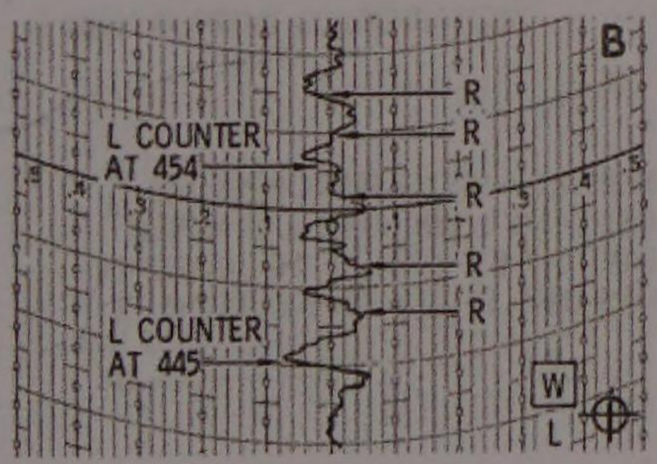


A T COUNTER IS SET AT 522. THE RIGHT WING MARK IS AT THE OUTSIDE PEAK OF THE MANEUVER INDICATING T PERM IS PRESENT

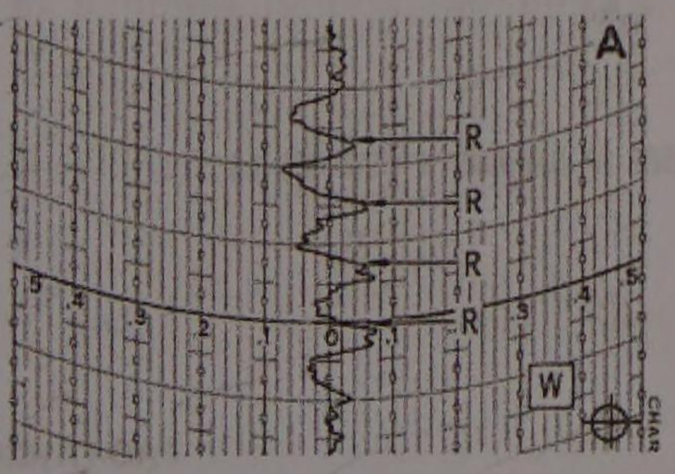
II. L PERM AND Iv EDDY CURRENT COMPENSATION



C THE Iv COUNTER CHANGED FROM 464 TO 460 DURING THE MANEUVERS. THE MANEUVER NOISE IS DOWN TO THE SYSTEM NOISE INDICATING THAT L AND Iv HAVE BEEN COMPENSATED



B THE L COUNTER CHANGED FROM 445 TO 451 DURING THE MANEUVERS. THE NOSE RIGHT MARK MOVED FROM THE OUTSIDE PEAK TO THE CENTER OF THE MANEUVER NOISE. THIS INDICATES THAT SOME Iv EDDY CURRENT IS STILL PRESENT



A THE L COUNTER IS SET AT 445 AND THE Iv COUNTER IS SET AT 464

NOTE

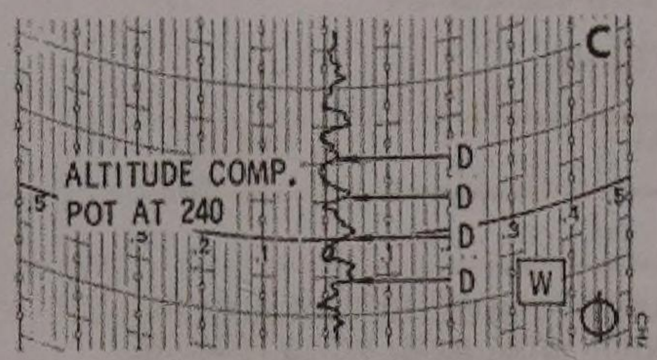
THE ASQ-10 MAD USES PITCHES INSTEAD OF YAWS FOR L AND Iv COMPENSATIONS

PAC-1.1(C)0097

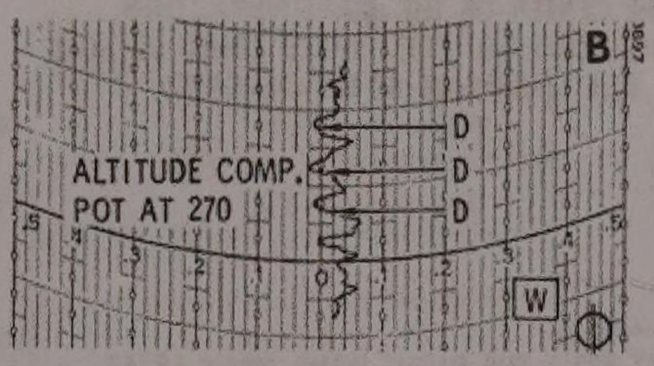
Figure 3-22. Typical MAD Compensation (Sheet 1 of 3)

TYPICAL MAD COMPENSATION

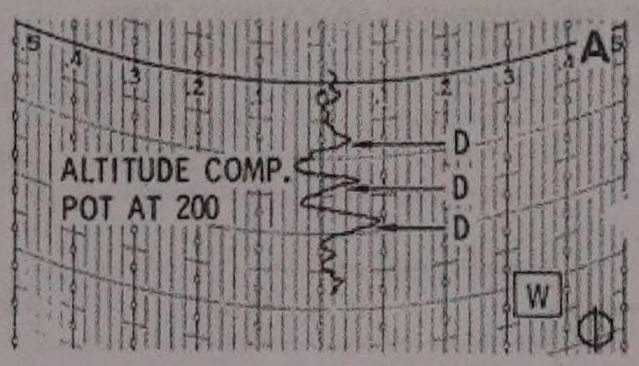
III. ALTITUDE COMPENSATOR SETTING



C THE ALTITUDE COMPENSATOR POT IS SET AT 240. THE PITCH MANEUVER NOISE IS NOW CLOSE TO THE STRAIGHT AND LEVEL NOISE INDICATING A CORRECT POT SETTING



B THE ALTITUDE COMPENSATOR POT IS SET AT 270. THE NOSE DOWN MARK HAS MOVED TO THE LEFT PEAK INDICATING THE POT WAS MOVED TOO FAR

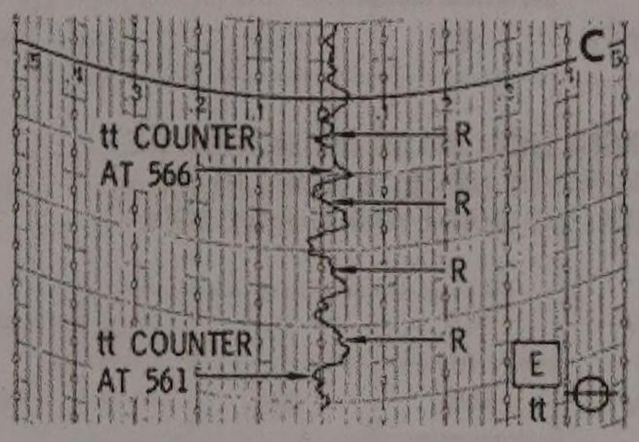


A THE ALTITUDE COMPENSATOR POT IS SET AT 200. THE NOSE DOWN MARK IS ON THE RIGHT PEAK

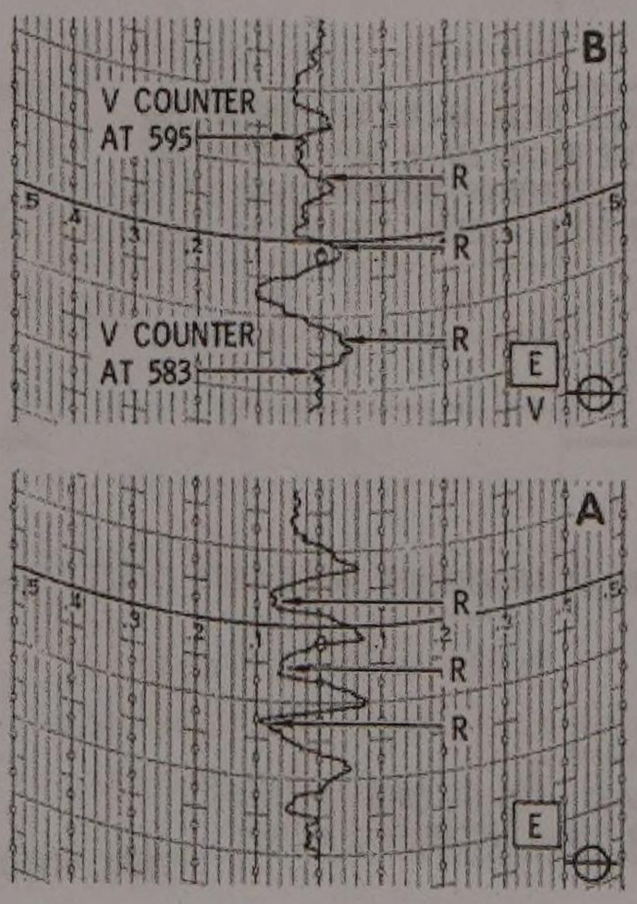
NOTE

ALTITUDE COMPENSATION IS NOT DONE WITH AN/ASQ 10 MAD SYSTEM

IV. V PERM AND tt EDDY CURRENT COMPENSATION



C THE tt COUNTER CHANGED FROM 561 TO 566 DURING THE MANEUVERS. THE MANEUVER NOISE IS DOWN TO THE SYSTEM NOISE INDICATING THAT V AND tt HAVE BEEN COMPENSATED



B THE V COUNTER CHANGED FROM 583 TO 595 DURING THE MANEUVERS. THE RIGHT WING DOWN MARK HAS MOVED FROM THE OUTSIDE PEAK TO THE CENTER OF THE MANEUVER NOISE. THIS INDICATES THAT SOME tt EDDY CURRENT IS STILL PRESENT

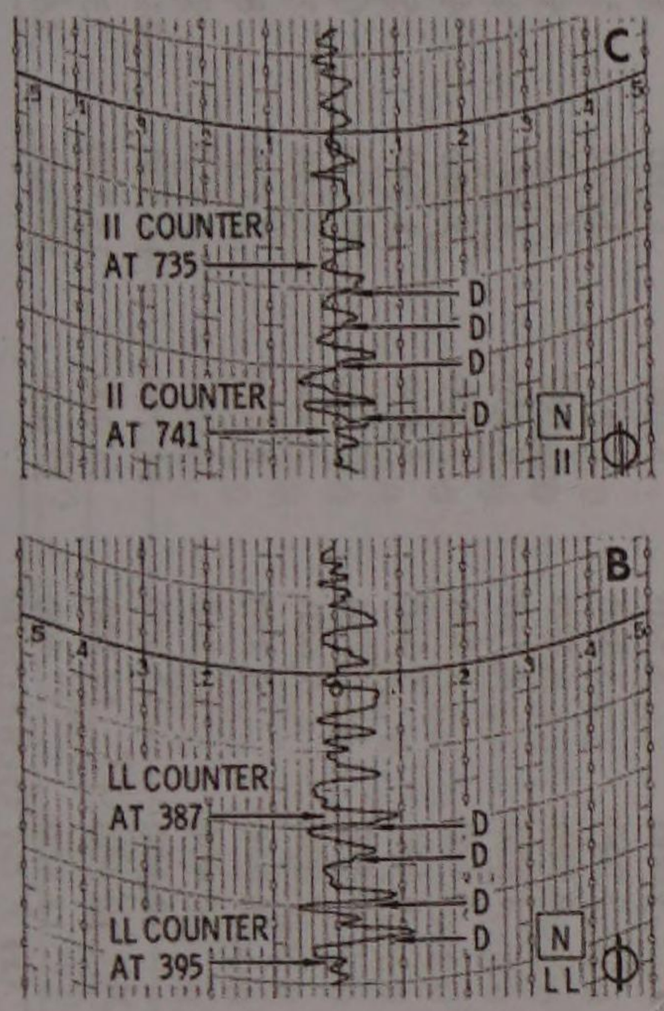
A THE V COUNTER IS SET AT 583 AND tt COUNTER IS SET AT 561

PAC-1.1(C)0098

Figure 3-22. Typical MAD Compensation (Sheet 2 of 3)

TYPICAL MAD COMPENSATION

V. LL INDUCED AND II EDDY CURRENT COMPENSATION

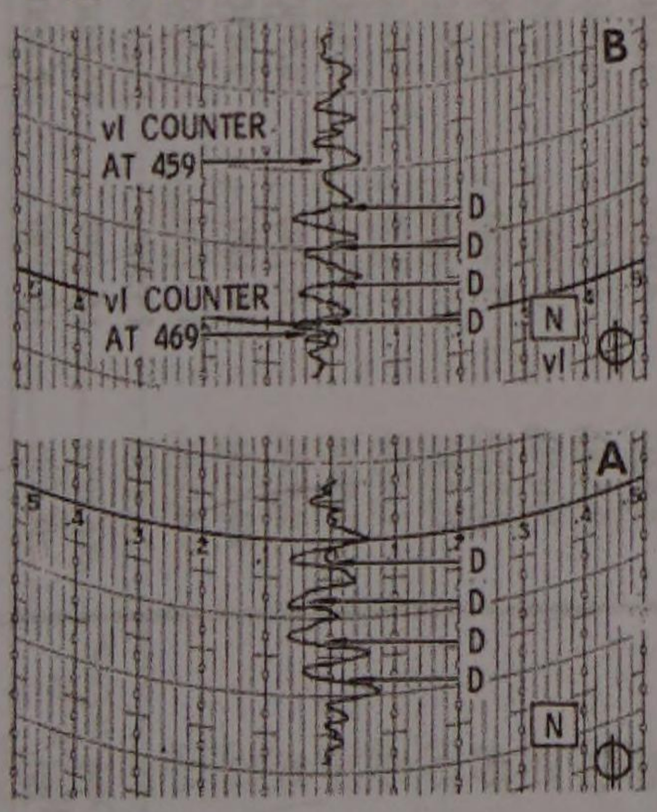


C THE II COUNTER CHANGED FROM 741 TO 735 DURING THE MANEUVERS. THE MANEUVER NOISE IS DOWN TO THE SYSTEM NOISE INDICATING THE LL AND II HAVE BEEN COMPENSATED

B THE LL COUNTER CHANGED FROM 395 TO 387 DURING THE MANEUVERS. THE NOSE DOWN MARK MOVED FROM THE OUTSIDE PEAK TO THE CENTER OF THE MANEUVER NOISE. THIS INDICATES THAT SOME II EDDY CURRENT IS STILL PRESENT

A THE LL COUNTER IS SET AT 395 AND THE II COUNTER IS SET AT 741

VI. vI EDDY CURRENT COMPENSATION



B THE vI COUNTER CHANGED FROM 469 TO 459 DURING THE MANEUVERS. THE MANEUVER NOISE IS DOWN TO THE SYSTEM NOISE INDICATING THAT vI HAS BEEN COMPENSATED

A THE vI COUNTER IS SET TO 469. THE NOSE DOWN MARK IS IN THE CENTER OF THE MANEUVER NOISE INDICATING AN EDDY CURRENT IS PRESENT

NOTE

THIS TERM IS NOT USED WITH AN/ASQ 10 MAD SYSTEM

PAC-1.1(C)0099

Figure 3-22. Typical MAD Compensation (Sheet 3 of 3)

Multiplication Coefficients for LV Compensation Above 45 Degrees

DIP ANGLE (ø) IN DEGREES	EARTH'S FIELD STRENGTH (H_e) IN OERSTEDS										
	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.50
	MULTIPLICATION COEFFICIENTS										
45	0.884	0.863	0.842	0.822	0.804	0.786	0.769	0.752	0.737	0.722	0.707
46	0.926	0.904	0.882	0.862	0.842	0.823	0.805	0.788	0.772	0.756	0.741
47	0.981	0.957	0.934	0.912	0.891	0.871	0.853	0.835	0.817	0.800	0.784
48	1.040	1.010	0.987	0.964	0.943	0.922	0.902	0.882	0.864	0.847	0.830
49	1.100	1.070	1.040	1.020	0.996	0.974	0.953	0.933	0.913	0.894	0.876
50	1.160	1.130	1.100	1.070	1.050	1.030	1.010	0.984	0.964	0.944	0.925
51	1.220	1.190	1.160	1.130	1.100	1.080	1.060	1.040	1.020	0.998	0.978
52	1.300	1.270	1.240	1.210	1.180	1.150	1.120	1.100	1.080	1.060	1.040
53	1.380	1.350	1.320	1.290	1.260	1.230	1.200	1.170	1.140	1.120	1.100
54	1.470	1.430	1.390	1.360	1.330	1.300	1.270	1.250	1.220	1.190	1.170
55	1.560	1.520	1.480	1.440	1.410	1.380	1.350	1.320	1.290	1.260	1.240
56	1.660	1.620	1.580	1.540	1.500	1.470	1.440	1.410	1.380	1.350	1.320
57	1.770	1.720	1.680	1.640	1.600	1.570	1.540	1.500	1.470	1.440	1.410
58	1.890	1.840	1.800	1.760	1.720	1.680	1.640	1.610	1.570	1.540	1.510
59	2.010	1.970	1.920	1.880	1.830	1.790	1.750	1.710	1.680	1.650	1.610
60	2.160	2.110	2.060	2.010	1.970	1.920	1.880	1.840	1.800	1.770	1.730
61	2.320	2.260	2.210	2.160	2.110	2.060	2.020	1.970	1.930	1.890	1.860
62	2.500	2.440	2.380	2.330	2.280	2.230	2.180	2.130	2.080	2.040	2.000
63	2.700	2.630	2.570	2.510	2.460	2.400	2.350	2.300	2.250	2.200	2.160
64	2.920	2.870	2.780	2.720	2.660	2.600	2.540	2.490	2.440	2.390	2.340
65	3.170	3.090	3.020	2.940	2.880	2.820	2.760	2.700	2.640	2.580	2.530
66	3.460	3.370	3.290	3.220	3.140	3.070	3.000	2.940	2.880	2.820	2.770
67	3.770	3.680	3.590	3.510	3.430	3.360	3.280	3.210	3.140	3.080	3.020
68	4.130	4.030	3.940	3.850	3.760	3.680	3.600	3.520	3.440	3.380	3.310
69	4.550	4.450	4.340	4.240	4.150	4.050	3.960	3.880	3.800	3.720	3.640
70	5.030	4.900	4.780	4.680	4.570	4.460	4.380	4.280	4.180	4.110	4.020
71	5.550	5.420	5.300	5.170	5.050	4.940	4.830	4.730	4.630	4.540	4.450
72	6.230	6.080	5.930	5.800	5.670	5.540	5.420	5.300	5.200	5.080	4.980
73	7.000	6.830	6.660	6.510	6.370	6.230	6.190	5.960	5.830	5.720	5.610
74	7.900	7.700	7.520	7.350	7.180	7.020	6.870	6.730	6.590	6.450	6.320
75	9.010	8.780	8.580	8.380	8.180	8.000	7.830	7.660	7.500	7.350	7.200
76	10.400	10.100	9.850	9.630	9.420	9.200	9.010	8.820	8.640	8.470	8.300
77	12.000	11.700	11.500	11.200	10.900	10.700	10.400	10.200	10.000	9.810	9.620
78	14.100	13.800	13.500	13.200	12.900	12.600	12.300	12.000	11.700	11.500	11.300
79	16.800	16.400	16.000	15.600	15.200	14.900	14.600	14.300	14.000	13.700	13.400
80	20.400	19.900	19.400	19.000	18.600	18.200	17.800	17.400	17.000	16.600	16.300

Figure 3-23. Multiplication Coefficients for LV Compensation Above 45 Degrees (Sheet 1 of 2)

Multiplication Coefficient for LV Compensation Above 45 Degrees

DIP ANGLE ∅ IN DEGREES	EARTH'S FIELD STRENGTH (H_e) IN OERSTEDS									
	0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.60
	MULTIPLICATION COEFFICIENTS									
45	0.693	0.680	0.667	0.655	0.643	0.631	0.620	0.609	0.599	0.589
46	0.726	0.712	0.699	0.686	0.673	0.661	0.650	0.639	0.628	0.618
47	0.769	0.754	0.740	0.726	0.713	0.700	0.688	0.676	0.665	0.654
48	0.813	0.797	0.782	0.768	0.754	0.740	0.727	0.715	0.703	0.691
49	0.859	0.843	0.827	0.811	0.797	0.783	0.769	0.756	0.743	0.731
50	0.907	0.890	0.873	0.857	0.841	0.826	0.812	0.798	0.784	0.771
51	0.959	0.940	0.923	0.905	0.899	0.873	0.858	0.843	0.829	0.815
52	1.020	1.000	0.980	0.962	0.945	0.928	0.912	0.896	0.880	0.866
53	1.080	1.060	1.040	1.020	1.000	0.987	0.969	0.952	0.936	0.921
54	1.150	1.130	1.110	1.090	1.070	1.050	1.030	1.010	0.994	0.978
55	1.220	1.200	1.180	1.150	1.130	1.110	1.090	1.070	1.050	1.040
56	1.290	1.270	1.250	1.230	1.210	1.180	1.160	1.140	1.120	1.100
57	1.380	1.360	1.330	1.310	1.280	1.260	1.240	1.220	1.200	1.180
58	1.480	1.450	1.420	1.400	1.370	1.350	1.320	1.300	1.280	1.260
59	1.580	1.550	1.520	1.490	1.470	1.440	1.420	1.390	1.370	1.340
60	1.700	1.660	1.630	1.600	1.570	1.540	1.520	1.490	1.470	1.440
61	1.820	1.780	1.750	1.720	1.690	1.660	1.630	1.600	1.570	1.550
62	1.960	1.920	1.890	1.850	1.820	1.790	1.760	1.730	1.700	1.670
63	2.120	2.080	2.040	2.000	1.960	1.930	1.890	1.860	1.830	1.800
64	2.290	2.250	2.210	2.170	2.130	2.090	2.050	2.020	1.980	1.950
65	2.480	2.430	2.380	2.340	2.30	2.260	2.220	2.180	2.140	2.110
66	2.710	2.660	2.610	2.560	2.520	2.470	2.420	2.380	2.340	2.300
67	2.960	2.900	2.850	2.790	2.740	2.700	2.650	2.600	2.560	2.520
68	3.240	3.180	3.120	3.060	3.000	2.950	2.900	2.850	2.800	2.760
69	3.570	3.500	3.440	3.380	3.320	3.260	3.200	3.140	3.090	3.040
70	3.940	3.870	3.790	3.720	3.660	3.590	3.530	3.470	3.410	3.350
71	4.360	4.280	4.200	4.120	4.050	3.970	3.900	3.840	3.770	3.710
72	4.890	4.790	4.700	4.620	4.530	4.450	4.370	4.300	4.230	4.150
73	5.490	5.380	5.290	5.180	5.100	5.010	4.910	4.830	4.750	4.670
74	6.200	6.090	5.970	5.860	5.750	5.650	5.550	5.450	5.360	5.270
75	7.060	6.830	6.800	6.680	6.540	6.430	6.320	6.210	6.110	6.000
76	8.130	7.970	7.820	7.680	7.540	7.400	7.260	7.140	7.020	6.900
77	9.440	9.260	9.080	8.910	8.750	8.600	8.450	8.300	8.150	8.020
78	11.100	10.900	10.700	10.500	10.300	10.100	9.920	9.740	9.580	9.320
79	13.100	12.800	12.600	12.400	12.200	12.000	11.800	11.600	11.400	11.200
80	16.000	15.700	15.400	15.100	14.800	14.500	14.200	14.000	13.800	13.600

Figure 3-23. Multiplication Coefficients for LV Compensation Above 45 Degrees (Sheet 2 of 2)

Multiplication Coefficients for LV Compensation Below 45 Degrees

1	2	3									
	DIP ANGLE ∅ IN DEGREES	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34
0.000	0	1.00	0.962	0.926	0.893	0.862	0.833	0.806	0.782	0.758	0.735
0.035	2	1.00	0.962	0.926	0.893	0.863	0.834	0.807	0.782	0.758	0.736
0.070	4	1.00	0.964	0.928	0.895	0.864	0.835	0.808	0.783	0.759	0.737
0.105	6	1.01	0.967	0.931	0.898	0.867	0.838	0.811	0.786	0.762	0.739
0.141	8	1.01	0.971	0.935	0.902	0.871	0.842	0.814	0.789	0.765	0.743
0.176	10	1.02	0.976	0.940	0.907	0.875	0.846	0.819	0.793	0.769	0.747
0.213	12	1.02	0.983	0.947	0.913	0.881	0.852	0.824	0.799	0.774	0.752
0.249	14	1.03	0.991	0.954	0.920	0.888	0.859	0.831	0.805	0.781	0.758
0.287	16	1.04	1.00	0.963	0.929	0.897	0.867	0.839	0.813	0.788	0.765
0.325	18	1.05	1.01	0.974	0.939	0.906	0.876	0.848	0.821	0.796	0.773
0.364	20	1.06	1.02	0.985	0.950	0.917	0.887	0.858	0.831	0.806	0.783
0.404	22	1.08	1.04	0.999	0.963	0.930	0.906	0.877	0.850	0.824	0.800
0.445	24	1.09	1.05	1.01	0.977	0.944	0.912	0.883	0.855	0.829	0.805
0.488	26	1.11	1.07	1.03	0.993	0.959	0.927	0.897	0.869	0.843	0.818
0.532	28	1.13	1.09	1.05	1.01	0.976	0.944	0.913	0.885	0.858	0.833
0.577	30	1.15	1.11	1.07	1.03	0.995	0.962	0.931	0.902	0.875	0.849
0.625	32	1.18	1.13	1.09	1.05	1.02	0.983	0.951	0.921	0.893	0.867
0.675	34	1.21	1.16	1.12	1.08	1.04	1.01	0.973	0.942	0.914	0.887
0.727	36	1.24	1.19	1.14	1.10	1.07	1.03	0.997	0.966	0.936	0.909
0.781	38	1.27	1.22	1.18	1.13	1.09	1.06	1.02	0.991	0.961	0.933
0.839	40	1.31	1.26	1.21	1.17	1.13	1.09	1.05	1.02	0.989	0.960
0.900	42	1.35	1.29	1.25	1.20	1.16	1.12	1.09	1.05	1.02	0.989
0.966	44	1.39	1.34	1.29	1.24	1.20	1.16	1.12	1.09	1.05	1.02
1.000	45	1.41	1.36	1.31	1.26	1.22	1.18	1.14	1.10	1.07	1.04

Figure 3-24. Multiplication Coefficients for LV Compensation Below 45 Degrees (Sheet 1 of 2)

Multiplication Coefficients for LV Compensation Below 45 Degrees

1	2	3									
	DIP ANGLE ∅ IN DEGREES	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45
0.000	0	0.714	0.694	0.676	0.658	0.641	0.625	0.610	0.595	0.581	0.568	0.556
0.035	2	0.715	0.695	0.676	0.658	0.641	0.625	0.610	0.596	0.582	0.569	0.556
0.070	4	0.716	0.696	0.677	0.659	0.643	0.627	0.611	0.597	0.583	0.570	0.557
0.105	6	0.718	0.698	0.679	0.662	0.645	0.628	0.613	0.599	0.585	0.571	0.559
0.141	8	0.721	0.701	0.682	0.664	0.647	0.631	0.616	0.601	0.587	0.574	0.561
0.176	10	0.725	0.705	0.686	0.668	0.651	0.635	0.619	0.604	0.590	0.577	0.564
0.213	12	0.730	0.710	0.691	0.673	0.655	0.639	0.623	0.609	0.594	0.581	0.568
0.249	14	0.736	0.716	0.696	0.678	0.661	0.644	0.628	0.613	0.599	0.586	0.573
0.287	16	0.743	0.722	0.703	0.684	0.667	0.650	0.634	0.619	0.605	0.591	0.578
0.325	18	0.751	0.730	0.710	0.692	0.674	0.657	0.641	0.626	0.611	0.597	0.584
0.364	20	0.760	0.739	0.719	0.700	0.682	0.665	0.649	0.633	0.619	0.605	0.591
0.404	22	0.777	0.755	0.735	0.715	0.697	0.680	0.663	0.647	0.632	0.618	0.604
0.445	24	0.782	0.760	0.740	0.720	0.702	0.684	0.667	0.652	0.636	0.622	0.608
0.488	26	0.795	0.773	0.752	0.732	0.713	0.695	0.678	0.662	0.647	0.632	0.618
0.532	28	0.809	0.787	0.765	0.745	0.726	0.708	0.691	0.674	0.658	0.644	0.629
0.577	30	0.825	0.802	0.780	0.760	0.740	0.722	0.704	0.687	0.671	0.656	0.642
0.625	32	0.842	0.819	0.797	0.776	0.756	0.737	0.719	0.702	0.686	0.670	0.655
0.675	34	0.862	0.838	0.815	0.794	0.773	0.754	0.735	0.718	0.701	0.685	0.670
0.727	36	0.883	0.858	0.835	0.813	0.792	0.773	0.754	0.736	0.719	0.702	0.687
0.781	38	0.906	0.881	0.857	0.835	0.813	0.793	0.774	0.755	0.738	0.721	0.705
0.839	40	0.932	0.907	0.882	0.859	0.837	0.816	0.796	0.777	0.759	0.742	0.725
0.900	42	0.961	0.934	0.909	0.885	0.863	0.841	0.820	0.801	0.782	0.765	0.748
0.966	44	0.993	0.965	0.939	0.915	0.891	0.869	0.848	0.828	0.808	0.790	0.772
1.000	45	1.01	0.982	0.956	0.930	0.907	0.884	0.862	0.842	0.822	0.804	0.786

Figure 3-24. Multiplication Coefficients for LV Compensation Below 45 Degrees (Sheet 2 of 2)

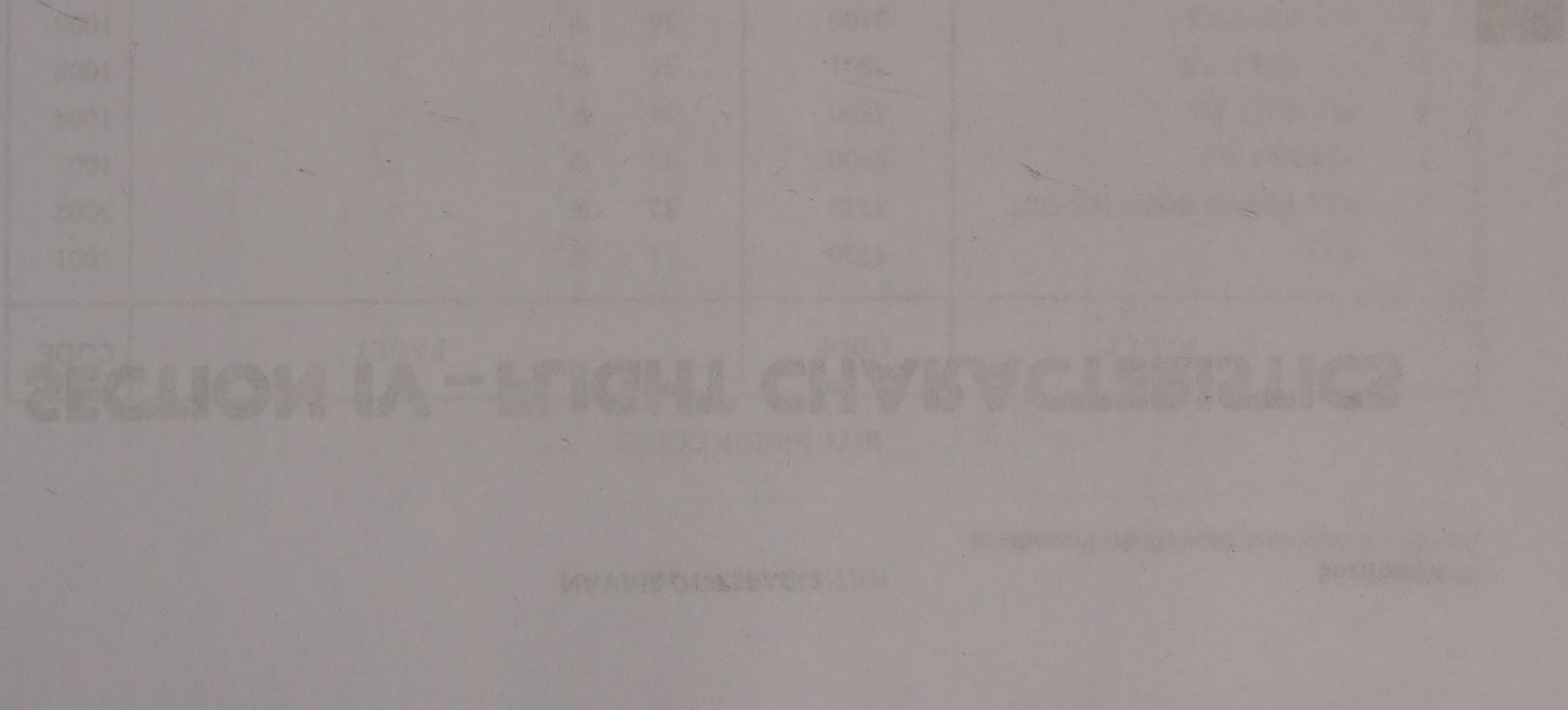
BITE ERROR CODES

FAULT	CODE	FAULT	CODE
1. RAM	5700	31. W_t	1001
2. ALL POWER SUPPLIES OUT	5340	32. W_1	3002
3. +5 VOLT P.S.	5900	33. W_v	1003
4. +15 VOLT P.S.	5800	34. W_1	1004
5. –15 VOLT P.S.	5801	35. W_2	1005
6. +11 VOLT P.S.	2100	36. W_3	1006
7. –11 VOLT P.S.	2101	37. W_4	1007
8. MAGNETOMETER ASSY	3000	38. W_5	1008
9. Hx, Hy	2670	39. W_6	1009
10. Hx, Hz	2680	40. LARMOR TOO LOW	7000
11. Hy, Hz	2780	41. NO BITE REQUEST	6000
12. Hx	2600	42. F/A STATUS	5100
13. Hy	2700	43. MAD2 SATURATED	5130
14. Hz	2800	44. Hx, Hy, Hz, DHx, DHy, DHz	
15. MUX II	5200	ALL $\leqslant$ 0.1 VOLTS	2671
16. OUTPUT COIL ASSY	4000	45. $Hx^2 + Hy^2 \geqslant 5.5V$	2672
17. T_{amp} FAIL & T_{cal} GOOD	2401	46. He >, 72 Oe	2674
18. T_{amp} FAIL & T_{cal} FAIL	2400	47. He <, 20 Oe	2674
19. L_{amp} FAIL & L_{cal} GOOD	2301	48. He $\neq$ 0.547/Hz/+26,000±15,000γ	2675
20. L_{amp} FAIL & L_{cal} FAIL	2300	49. Hx.DHx + Hy.DRy + Hz.DHz>$(0.2)^2$	2676
21. V_{amp} FAIL & V_{cal} GOOD	2201	50. $T_{cal} > T_{amp}$	2505
22. V_{amp} FAIL & V_{cal} FAIL	2200	51. $T_{cal} \neq T_{amp} \div 18 \pm 25\%$	2515
23. DHx	2201	52. $L_{cal} > L_{amp}$	2506
24. DHy	2202	53. $L_{cal} \neq L_{amp} \div 14 \pm 25\%$	2516
25. DHz	2203	54. $V_{cal} > V_{amp}$	2507
26. T_{cal}	2402	55. $V_{cal} \neq V_{amp} \div 18 + 25\%$	2517
27. L_{cal}	2302	56. MAD4 $\neq$ 2.MAD ± 12.5%	5205
28. V_{cal}	2202	57. MAD8 $\neq$ 2.MAD4 ± 12.5%	5206
29. SYSTEM COMMAND	5341	58. MAD16 $\neq$ 2.MAD8 ± 12.5%	5207
30. WEAPON LOAD	5204	59. NO FAULTS	-8888

Figure 3-25. BITE Error Codes

SECTION IV – FLIGHT CHARACTERISTICS

For information concerning the flight characteristics of the aircraft,
refer to NAVAIR 01-75PAC-1.



SECTION V—EMERGENCY PROCEDURES

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INTRODUCTION.

Section V describes the procedures to be used in coping with various emergencies which may be encountered during aircraft operation and which may require action by crewmembers in addition to flight station occupants. Crewmembers must have a thorough knowledge of these emergency procedures. Each emergency presents a different problem which can be solved only through specific remedial action. Judgment, precision, and teamwork, essential to handling emergencies quickly, can only be developed through frequent simulated emergencies and emergency drills. The pilot is responsible for safety of flight, and in this regard must determine that emergency procedures are properly completed. He may delegate accomplishment of certain phases of the emergency procedures to other crewmembers, but the main EXECUTION OF EMERGENCY PROCEDURES IS THE RESPONSIBILITY OF THE PILOT.

A pilot experiencing any emergency during flight shall, as soon as possible after completion of emergency checklists, notify surface craft or ground station in as much detail as is possible of the following:

a. Nature of the emergency.

b. Assistance desired.

c. Pilot intentions.

d. Any other information that might be related to the incident or any other incidents encountered that might affect the safety of the flight.

It must be kept in mind that the emergency procedures herein are guides to action and are not a substitute for the exercise of good judgment.

It must be understood that the Emergency Procedures listed herein apply primarily to single emergency situations and should be followed accordingly. With an engine failure, prior to securing a second engine, consideration should be given to its effect on safety of flight.

APU FIRE.

WARNING

If an APU fire occurs on the ground, the aircraft should be evacuated immediately by all personnel.

If a fire occurs in the APU compartment, the following actions take place automatically:

a. Flight station APU warning lights glow.

b. Flight station and cabin APU warning horns sound.

c. APU solenoid fuel valve closes.

d. As engine runs down, intake and exhaust doors close.

e. HRD fire extinguishing agent is discharged when the exhaust door is fully closed.

Note

If the exhaust door fails to close, the HRD extinguisher agent will discharge 20 seconds after the fire warning.

To operate the fire extinguishing system manually, proceed as follows:

1. Operate APU fire extinguisher manual release switch.
   a. APU fuel valve closes.
   b. Intake and exhaust doors close.
   c. HRD extinguishing agent is discharged after doors are fully closed.

Note

If the exhaust door fails to close, the HRD extinguisher agent will discharge 20 seconds after actuation of the discharge switch.

FUSELAGE FIRE OR ELECTRICAL FIRE OF UNKNOWN ORIGIN.

The most likely cause of interior fire is a fault in the electric or electronic installations. With this in mind, the flight station is so arranged that all electrical power sources can be cut off quickly and selectively by easily accessible flight station controls. The procedures suggested for combating various types of fires are intended to eliminate most likely sources first. If the fire cannot be located, the following action is required.

Note

The permanent magnet generator (PMG) control power to the generator control panel in the main load center is available at all times the generator is rotating and can be secured only by stopping generator rotation. The PMG power directly controls operation of the generator control relay (GCR) in the generator control panel (supervisory panels) and the generator exciter control field current in the generator and cannot be secured by placing the bus switches off. These units, both the GCR and exciter control field, can be deenergized by (1) placing the respective generator control switch OFF or (2) feathering the respective propeller (securing the APU if its respective generator control panel malfunctions), thus stopping generator rotation. Fires in any of these units are usually (but not always) preceded by a generator electrical failure (GCR trip) in which case feathering is the only alternative

CREW RESPONSIBILITY FOR FIRE OF UNKNOWN ORIGIN.

WARNING

- Remove personnel overcome by smoke/fumes from scene of fire before administering oxygen. Keep oxygen bottles away from scene of fire.
- All crewmembers shall wear flight gloves during electrical fire or fuselage fire of unknown origin.

NAV/COMM	Remain at station. Inspect ARO power supplies. Be prepared to pull applicable circuit breakers. Report progress to TACCO. Obtain aircraft position, draft emergency message, and be prepared to provide heading to nearest land.
TACCO	Direct crew efforts in locating and fighting fire. Direct remaining crew with unassigned duties to assist as required (such as obtain O_2 bottles, take messages to flight station, and so forth). Continuously report progress to flight station.
Sensor 1 Operator	Activate starboard overwing exit light, inspect the main load center, electronics racks F1 and 2, and HF-2 coupler. Inspect area beneath SS1 and SS2 stations. Be prepared to pull applicable circuit breakers as required. Report progress to TACCO.
Sensor 2 Operator	Activate port overwing exit light, obtain fire bottle at the end of sonobuoy stowage rack, inspect electronics racks E1 and 2; G1 and 2; and hydraulic service center. Be prepared to pull applicable circuit breakers as required. Report progress to TACCO.
Sensor 3 Operator	Give range and bearing to nearest ship or closest point of land. Inspect electronics racks C1, 2, 3, 4, and 5. Be prepared to pull applicable circuit breakers as required. Report progress to TACCO.

CREW RESPONSIBILITY FOR FIRE OF UNKNOWN ORIGIN (Cont)

ARM/ORD/ Stbd Aft Observer	Activate main cabin door exit light, obtain aft fire bottle, inspect all electronic racks aft of main cabin door, galley, deicer control panel, doppler well and top strobe light power supply in overhead. Be prepared to pull applicable circuit breakers as required. Report progress to TACCO.
Flight Tech/ Port Aft Observer	Obtain forward fire bottle, inspect electronics racks A1 and 2; B1, 2, and 3; D1, 2 and 3; HF-1 coupler; and A350 ICS isolation box in overhead between TACCO and NAV/COMM. Be prepared to pull applicable circuit breakers as required. Report progress to TACCO.
Off-duty Pilot/2nd Mech/or Flight Engineer	Inspect forward electrical load center. Be prepared to pull applicable circuit breakers as required. Report progress to pilot.

WARNING

Do not enter main load center in flight *except* in case of extreme emergency.

1. Alert crew, activate fire bill–Alerted (CP, TC).
2. Cabin exhaust fan–Off (E).

Note

Securing the cabin exhaust fan reduces air circulation in the aircraft, thereby aiding in locating the source of the fire. If it can be determined quickly that the fire is in a particular piece of equipment, this equipment can be isolated by pulling the appropriate circuit breaker or securing the bus.

If Fire Source Is Not Determined:

3. Bus A–OFF (E).

Note

Most tactical station lighting will be inoperative.

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4. Elevator, rudder, and aileron boost levers–Pull (E).
5. Bus B–OFF (E).
6. Generator switches No. 2 and 3–OFF (E).
7. Smoke masks–If necessary (P, CP, E).
8. Dump either left or right EDC–Dump (E).
9. Emergency descent–If required (FLIGHT IDLE, minimum differential, dump remaining EDC).

Note

- Good judgment should be exercised before deciding on an emergency descent in the case of a fuselage fire. When oxygen is provided for the entire crew, staying at high altitude and depressurizing may help to control fuselage fires.
- The copilot should make emergency transmission prior to next step as all radios will be inoperative.

10. Essential bus switch–OFF (E).

Note

- ICS will be inoperative.
- Outflow valve available electrically.

If Fire Persists:

Note

Electrically operated flight instruments may be necessary for safe flight, and power to them must not be shut off except as a last resort.

11. Generator switch No. 4–OFF (E).

SMOKE OR FUME ELIMINATION.

Attempt to locate, isolate, and extinguish the fire or source of smoke/fumes prior to initiating smoke removal procedure.

When depressurizing, take into account the minimum safe enroute altitude and crew oxygen requirements. If immediate smoke removal is thought necessary, use the following procedure:

1. Smoke masks–ON, oxygen 100 percent (P, CP, E). Notify all crewmembers to don smoke masks and use walk-around bottles with oxygen selector set to 100% OXYGEN.
2. Descend, as necessary (P).
3. Cabin exhaust fan switch–ON (E).
4. Depressurize.

With electrical power available:

a. Aux vent switch–OPEN (E).

Without electrical power available:

a. Depressurize pneumatically (E).

(1) Aircraft altitude – Not above 12,000 feet

(2) Cabin altitude – Set 10,000 feet

(3) BAR. CORR knob – Set 28 in. Hg

(4) Rate knob – Maximum

If Smoke Or Fumes Persist:

5. Free fall chute–Open (OBS).

6. Overhead smoke removal door–Open (E).

7. Reduce airspeed (170 knots maximum) (P).

8. Right emergency exit–Open (E).

WARNING

Never open a vent or emergency exit in the flight station before there is an opening in the cabin. Pressure buildup in the cabin (approximately 1-1/2 in. Hg) will make opening of a vent or door more difficult.

RESTORING ELECTRICAL POWER.

1. Oxygen selectors–OFF (P, CP, E).

2. Affected equipment–Disconnect (E).

3. Electrical load–Reduce to minimum (E).

4. Sync servo switches–As required (E).

5. Generator switches (one at a time)–ON (E).

6. Bus monitoring switches (one at a time)–ON (E).

7. Electrical load–Restore as required (E).

8. Start selector–OFF (E).

9. Cabin exhaust fan switch–ON (E).

10. Governor indexing–SET (E).

EXPLOSIVE DECOMPRESSION.

If explosive decompression occurs, the cabin pressure changes to the outside pressure in less than 1 second. Explosive decompression causes a fog which should not be confused with smoke. An explosive decompression affects all crewmembers and can be extremely dangerous if it occurs at high altitude. Some of the effects accompanying explosive decompression are rush of air from lungs, a momentary dazed sensation that passes immediately, possible gas pains, and hypoxia if oxygen equipment is not immediately available. Maintaining a safe pressure differential and having oxygen equipment immediately available are precautions that should be observed in pressurized compartments. If an explosive decompression occurs, the pilot must try to ascertain the cause of the trouble and if it cannot be fixed in flight he should decide immediately whether to continue the mission or to descend to a safe altitude.

RAPID DECOMPRESSION.

Rapid aircraft decompression may commence as a result of a landing gear scissor switch malfunction and can be recognized by loss of EDC spread and the autopilot (if engaged). In the event of a scissor switch failure and loss of associated aircraft systems functions, perform the following steps:

1. Pressurization ground check switch–Test.

2. Ground air conditioning switch–ON.

Note

Manual modulation of the outflow valve may be required initially to minimize cycling.

Once pressurization is regained:

3. Ground air sensing circuit breaker–Pull.

4. Pressurization ground check switch–NORMAL.

CAUTION

In the event of scissor switch failure and performance of the above procedure, the ground air sensing circuit breaker should be reset after landing rollout.

EMERGENCY DEPRESSURIZATION.

With Electrical Power Available.

1. Aux vent switch–OPEN (E).
2. Outflow valve switch–OPEN (E).
3. Left and right engine-driven cabin air compressor switches–DUMP (E).
4. Aux vent switch–Close at 1 in. differential (E).

Without Electrical Power Available:

1. Free fall chute–Open (OBS).

EMERGENCY DESCENT PROCEDURES.

Emergency descent from high altitude should be made with the landing gear extended at a maximum permissible indicated airspeed of 300 knots when below FL245 and at Mach limit dive speed above FL245. A high rate of descent can be obtained with a gear-down configuration while retaining better aircraft controllability than in a clean configuration Mach limit airspeed descent. The highest angle of descent can be achieved by descending with the landing gear and wing flaps extended, however, the rate of descent will be less due to reduced permissible airspeeds imposed by wing flap extension.

DESCENT WITH LANDING GEAR EXTENDED.

1. Autopilot–Disengaged.
2. Power levers–FLIGHT IDLE.
3. Landing gear lever–DOWN.
4. Airspeed–Descent at speeds up to 300 IAS (Mach limit dive speed above FL245).
5. Pressurization–As required.
6. Windshield heat switches–HIGH (to prevent fogging).

EMERGENCY EXITS/ENTRANCES.

The hatches shown in figures 5-1 and 5-2 are the normal means of surface emergency evacuation. The main cabin door shown in figure 5-3 may also be used. If it is necessary to enter the aircraft to rescue trapped personnel, open the emergency exits (figures 5-1, 5-2, and 5-3), all of which are operable from inside or outside.

Note

The overwing hatches and main door each have a "phosphorus button" located by the handle to aid in complete darkness.

EMERGENCY EVACUATION.

The overwing hatches will be used during aircraft evacuation resulting from brake fire, uncontrolled engine fire on the ground, land or water ditching or any other emergency requiring prompt egress from the aircraft. The crew will commence aircraft evacuation when directed by the pilot, using all available exits (normally those on side opposite of a fire). All crewmembers are to stay a safe distance away from the aircraft. It is preferable to stay well behind the aircraft. For example, if a wheel explodes due to rapid cooling, the fragments tend to fly out sideways from the wheel.

LANDING WITHOUT ALL GEAR EXTENDED OR LANDING ON SOFT GROUND OR UNPREPARED SURFACE.

WARNING

Crewmembers shall evacuate stations nearest to propeller plane. See NAVAIR 01-75PAC-1, Section V for complete procedure.

DITCHING.

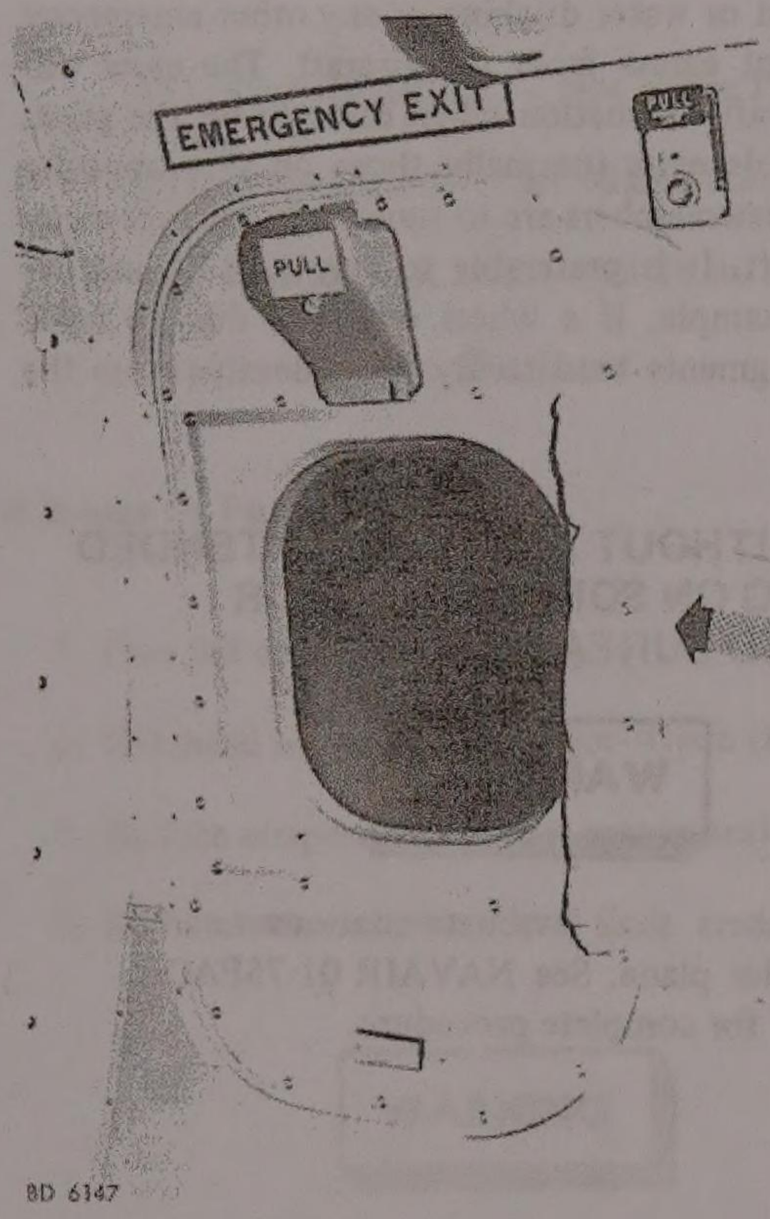
It is essential that each crewmember be thoroughly familiar with the ditching procedures, with his duties, and the duties of all other crewmembers, so that in case of injury to one member, his duties may be assigned to or assumed by another. Responsibility for each piece of equipment to be removed from the aircraft is assigned to the specific crew positions. Periodic drills will ensure an orderly operation when an emergency occurs, and will familiarize flight personnel with the location of all emergency equipment (see figure 5-4).

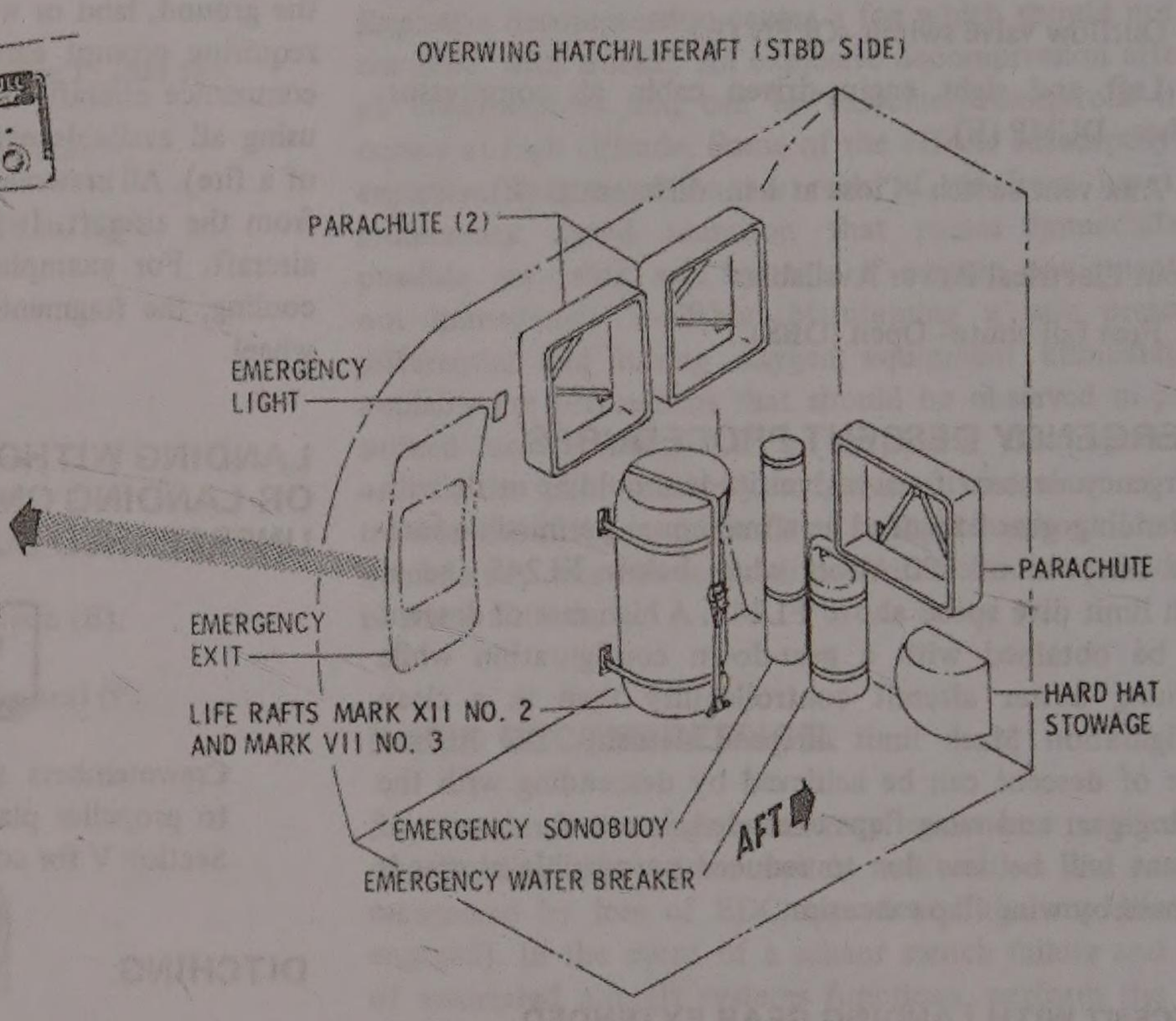
Note

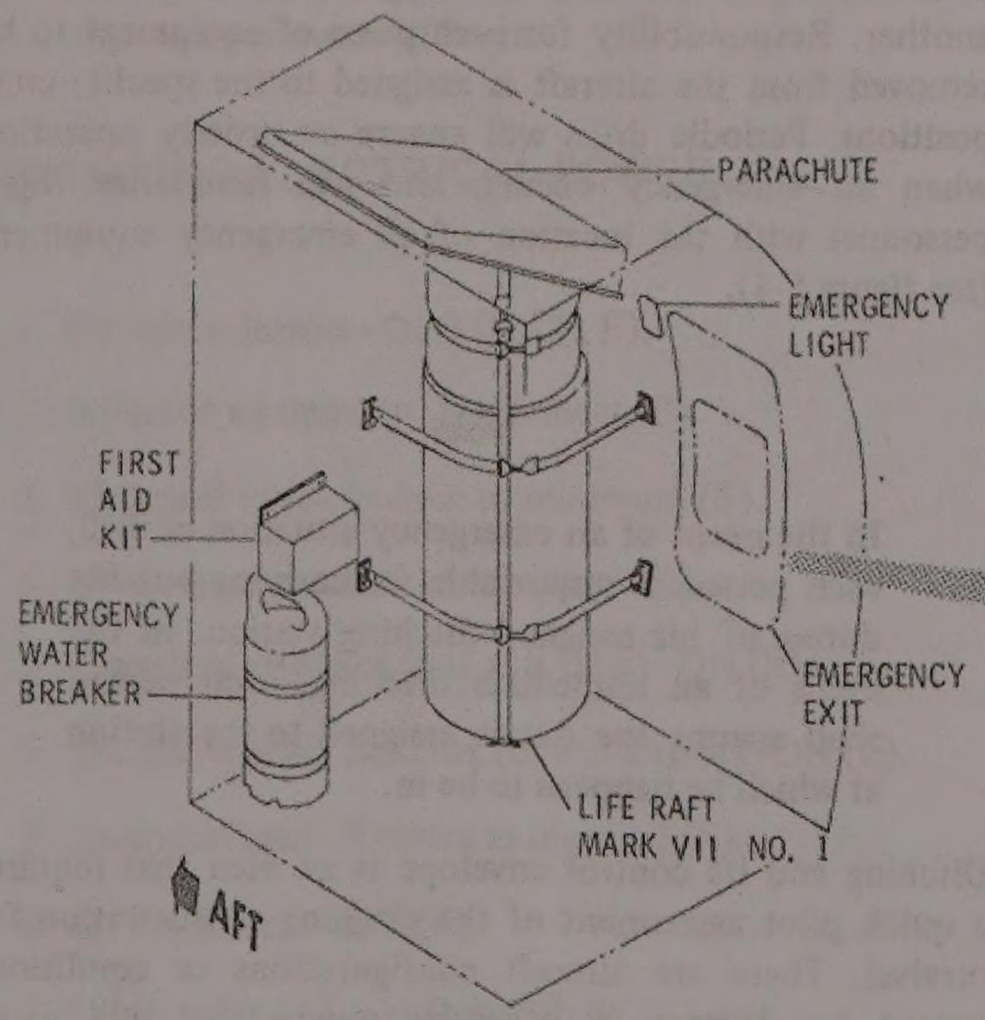
In the event of an emergency situation or drill, each person is responsible for carrying out the duties of his assigned ditching station. In the event of an immediate ditching, each person shall assume the duties assigned to the station at which he happens to be in.

Ditching and its control envelope is an area that requires a quick pilot assessment of the ditching configuration for survival. There are aircraft configurations or conditions caused by damage or other unknowns that will make successful ditching marginal.

OVERWING EMERGENCY ESCAPE HATCHES AND LIFERAFT STOWAGE







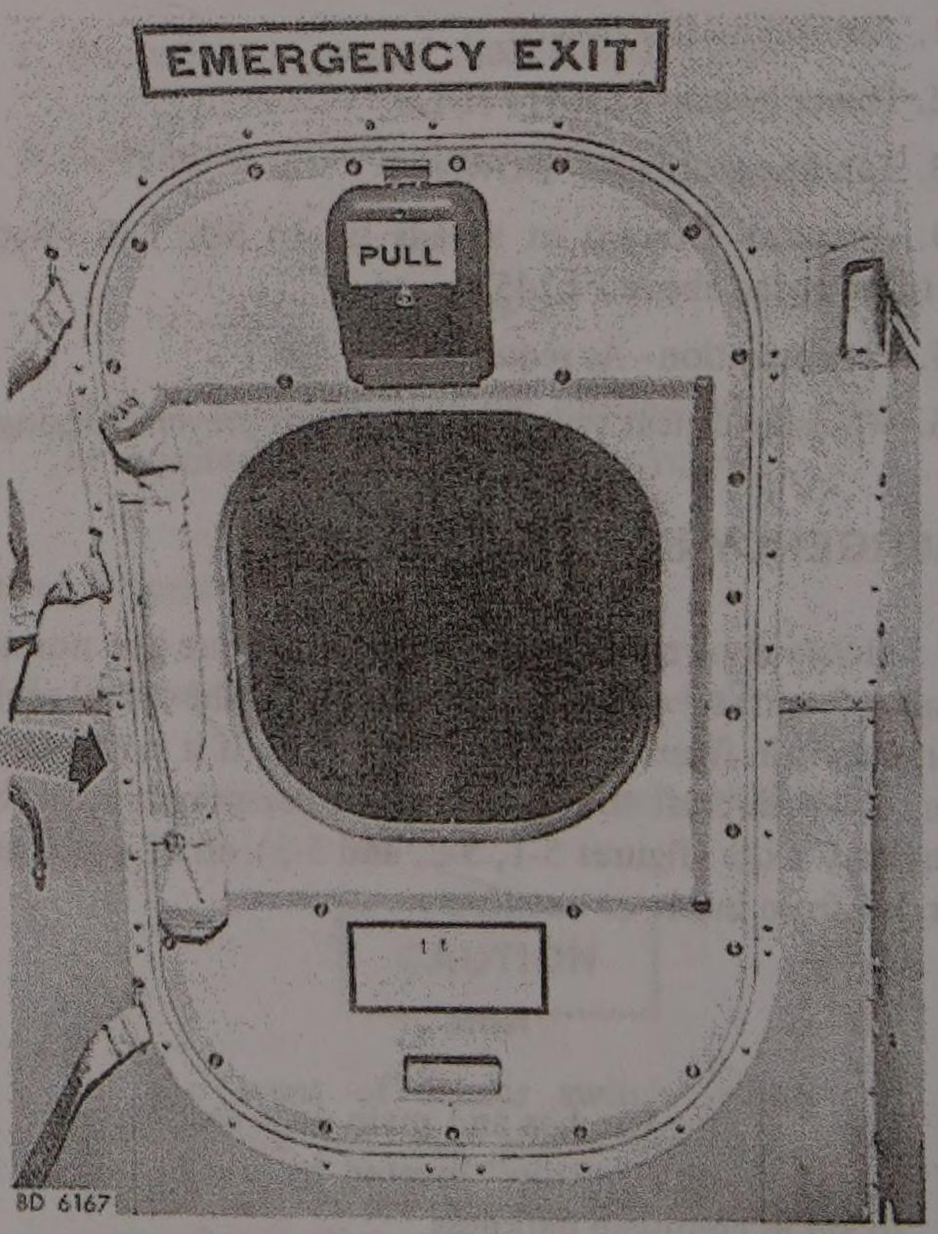


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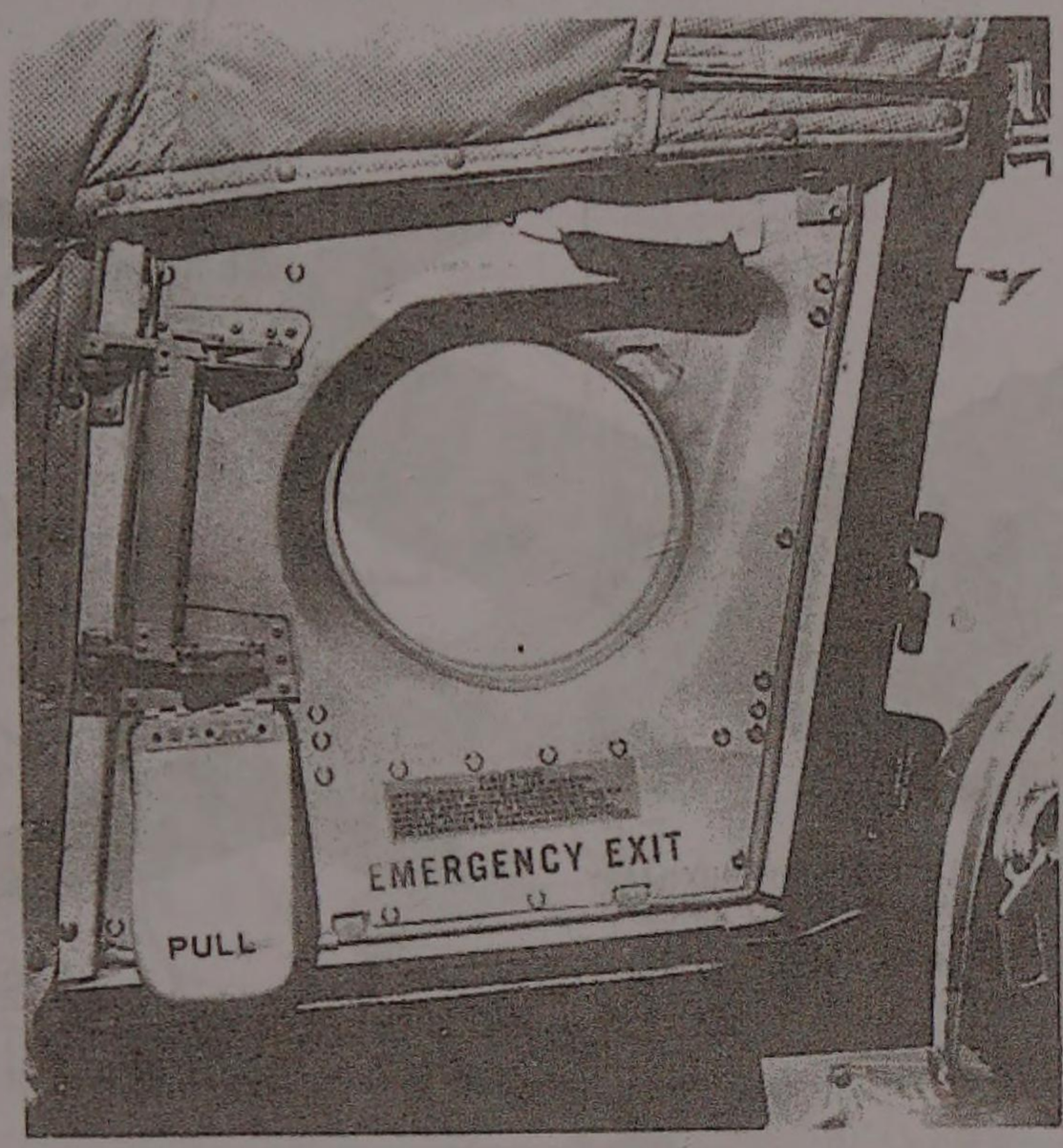
Figure 5-1. Overwing Emergency Escape Hatches and Liferaft Stowage

FLIGHT STATION ALTERNATE EMERGENCY EXIT HATCHES

FLIGHT STATION AUXILIARY EMERGENCY EXIT*



*AIRCRAFT BUNO
159889, 160290
AND SUBSEQUENT

FLIGHT STATION OVERHEAD EMERGENCY EXIT AND SMOKE REMOVAL DOOR

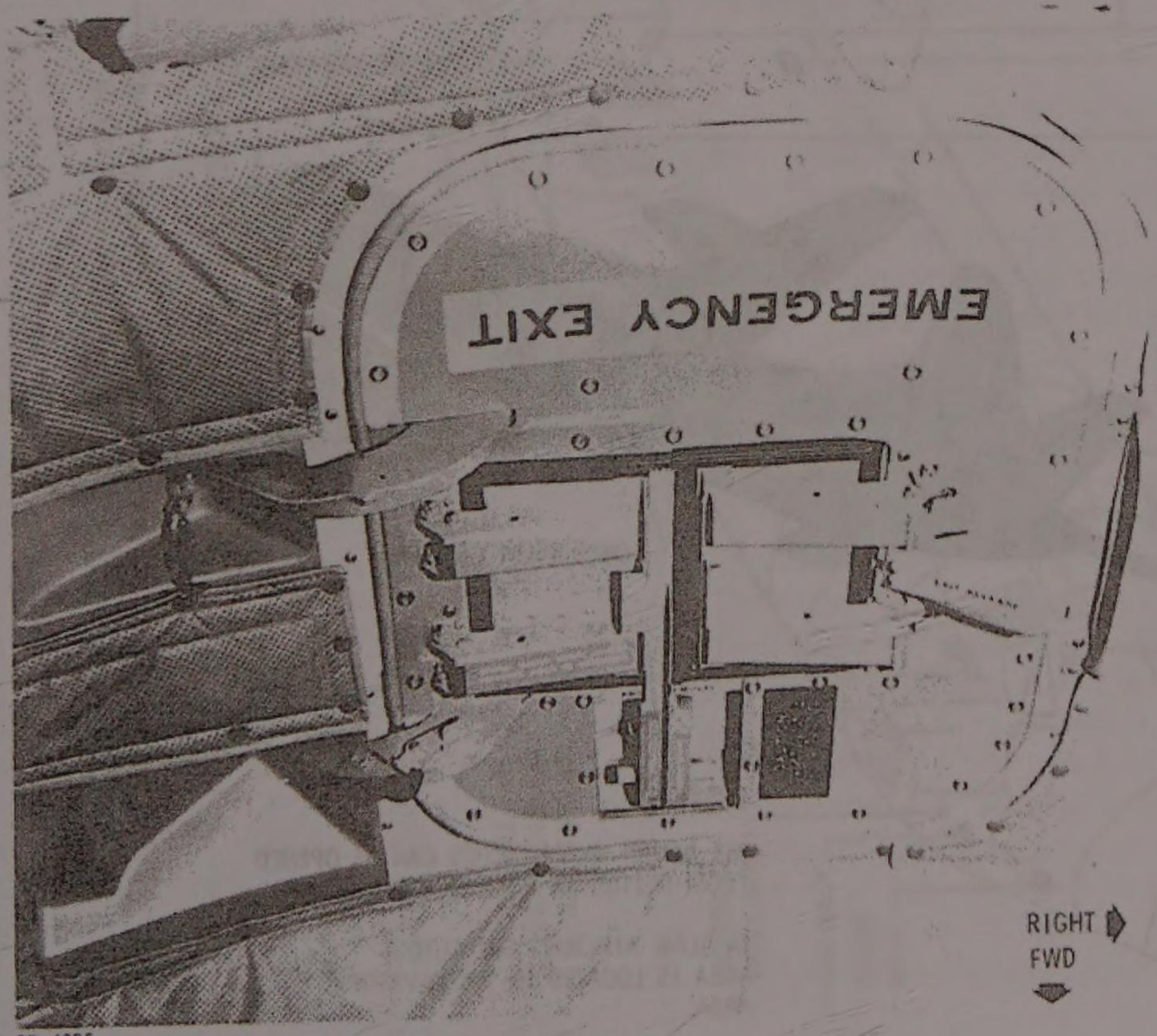
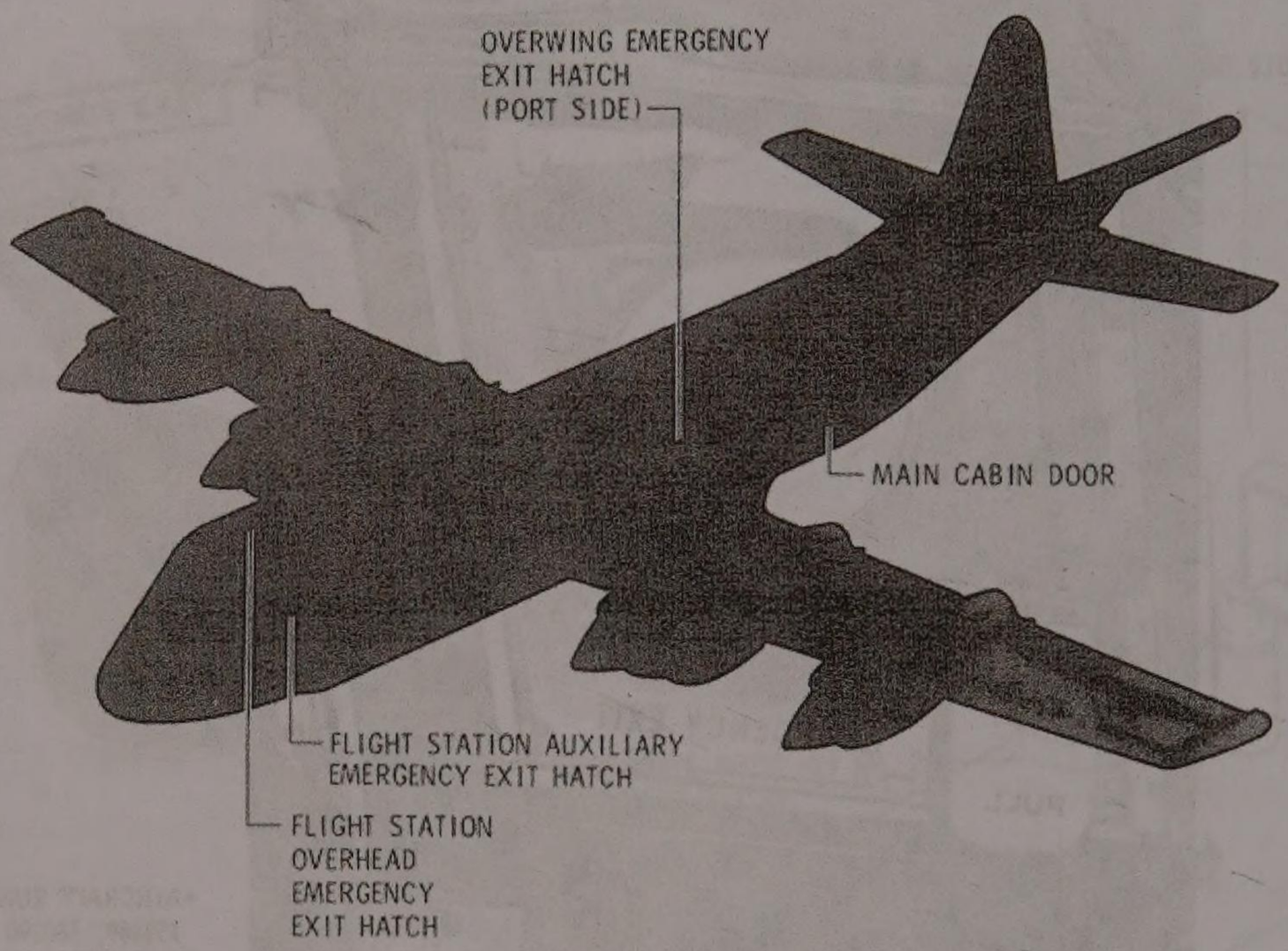


Figure 5-2. Flight Station Alternate Emergency Exit Hatches

EMERGENCY ENTRANCES AND EXITS



NOTE

ALL DOORS AND HATCHES CAN BE OPENED FROM INSIDE OR OUTSIDE OF AIRCRAFT.

IN SOME AIRCRAFT THE CUTOUT AREA IS LOCATED IN THE LAVATORY AREA.

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Figure 5-3. Emergency Entrances and Exits

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EMERGENCY EQUIPMENT LOCATION (MISCELLANEOUS)

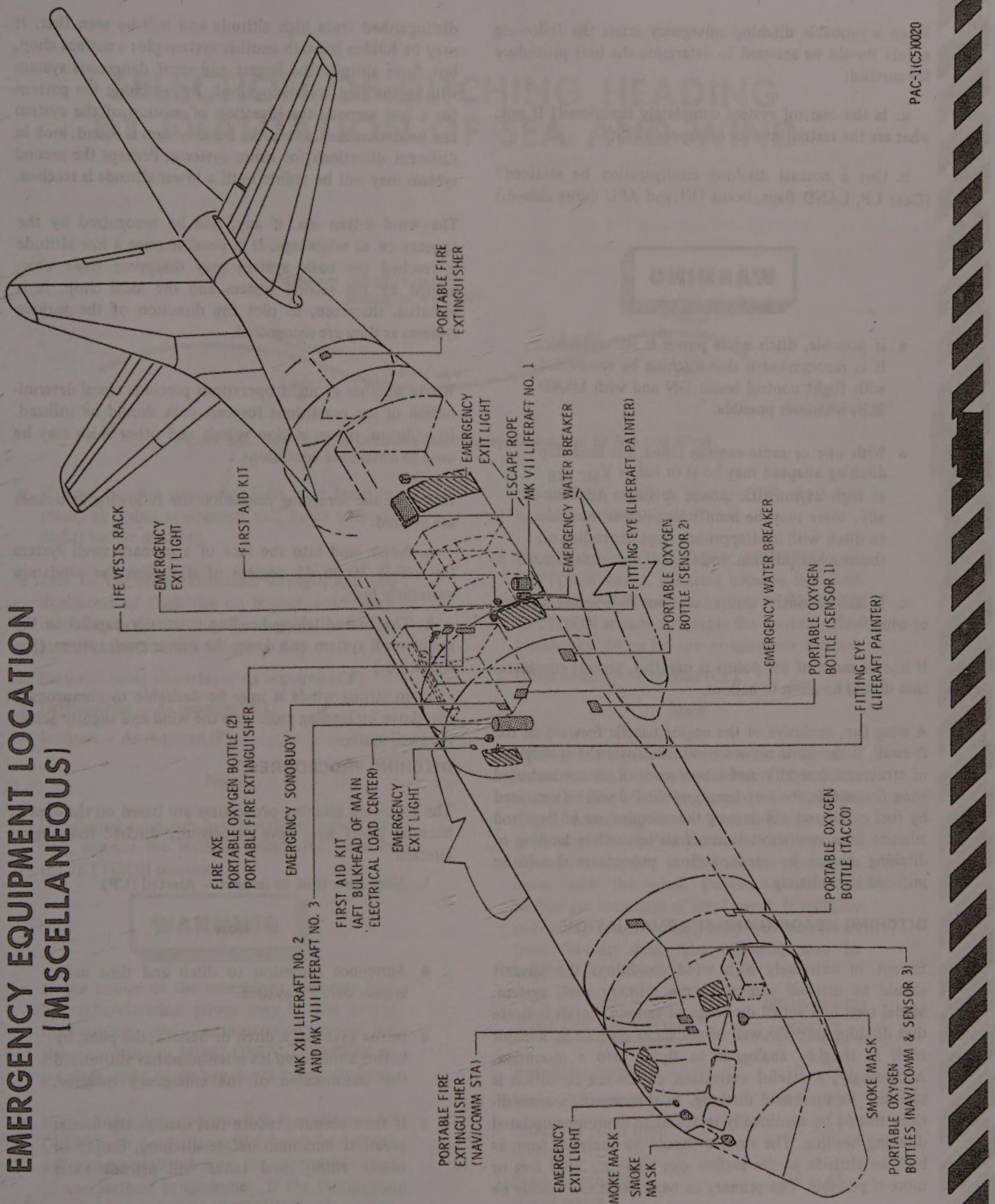


Figure 5-4. Emergency Equipment Location (Miscellaneous)

When a probable ditching emergency arises the following points should be assessed to determine the best procedure for survival:

a. Is the control system completely functional? If not, what are the restrictions for low speed flight?

b. Can a normal ditching configuration be attained? (Gear UP, LAND flaps, boost ON, and APU doors closed.)

WARNING

- If possible, ditch while power is still available. It is recommended that ditching be conducted with flight control boost ON and with LAND flaps whenever possible.

- With one or more engines failed, the land flap ditching airspeed may be at or below $V_{MC\ AIR}$ at high asymmetric power settings. Additionally, there may be insufficient power available to ditch with land/approach flaps depending on the number, position, and type of engine failure.

c. Is lateral control assured and not endangered because of wing fire?

If one or more of the points is negative, serious consideration should be given to bailout.

A wing fire, exclusive of the engine nacelle forward of the firewall, is the most serious condition from the standpoint of structural integrity and lateral control. A concentrated wing fire within the box beams of the P-3 will be sustained by fuel or oil and will destroy the effective use of flaps and ailerons in a very short time. If an immediate landing or ditching cannot be made, bailout procedures should be initiated immediately.

DITCHING HEADING AND SEA EVALUATION.

Except in extremely high wind conditions the aircraft should be ditched parallel to the primary swell system. Model tests and actual ditchings of various aircraft indicate that ditching into the wall of sea water created by a major swell is roughly analogous to flying into a mountain. Accordingly, a careful evaluation of the sea condition is essential to successful ditching. In this regard, sea conditions should be continually reviewed to determine updated ditching heading. The surface should be analyzed from as high an altitude as the surface can be seen, 2000 feet or more if possible. The primary or basic swell can readily be distinguished from high altitude and will be seen first. It may be hidden beneath another system plus a surface chop, but from altitude the largest and most dangerous system will be the first one recognized. By watching the pattern for a few seconds the direction of motion of the system can be determined. Once the basic system is found, look in different directions for other systems. Perhaps the second system may not be visible until a lower altitude is reached.

The wind driven sea, if any, will be recognized by the appearance of whitecaps. It is possible once a low altitude is reached the basic system may disappear from view, hidden by the second system and the local chop. It is essential, therefore, to plot the direction of the various systems as they are recognized.

Where weather or night operations preclude visual determination of sea conditions forecast data should be utilized. In addition, ocean station vessels and other ships may be used to obtain sea conditions.

Based on the foregoing discussion the following guidelines are offered:

a. Never land into the face of a primary swell system (or within 30 to 45 degrees of it) unless the winds are extremely high.

b. The best ditching heading is usually parallel to the major swell system and down the minor swell system. (See figure 5-5.)

c. In strong winds it may be desirable to compromise the above by landing more into the wind and slightly across the swell system.

DITCHING PROCEDURES.

The following ditching procedures are based on the experience of pilots who have successfully ditched four-engine aircraft:

1. Alert crew time to impact – Alerted (CP).

Note

- Announce intention to ditch and time until impact over PA system.

- In the event of a ditch or bailout, the pilot, by having announced his intentions, has authorized the transmission of the emergency message.

- If time permits, reduce fuel load to the lowest practical minimum before ditching. Empty or nearly empty fuel tanks will provide extra buoyancy.

SELECTION OF DITCHING HEADING BY EVALUATION OF SEA AND WIND

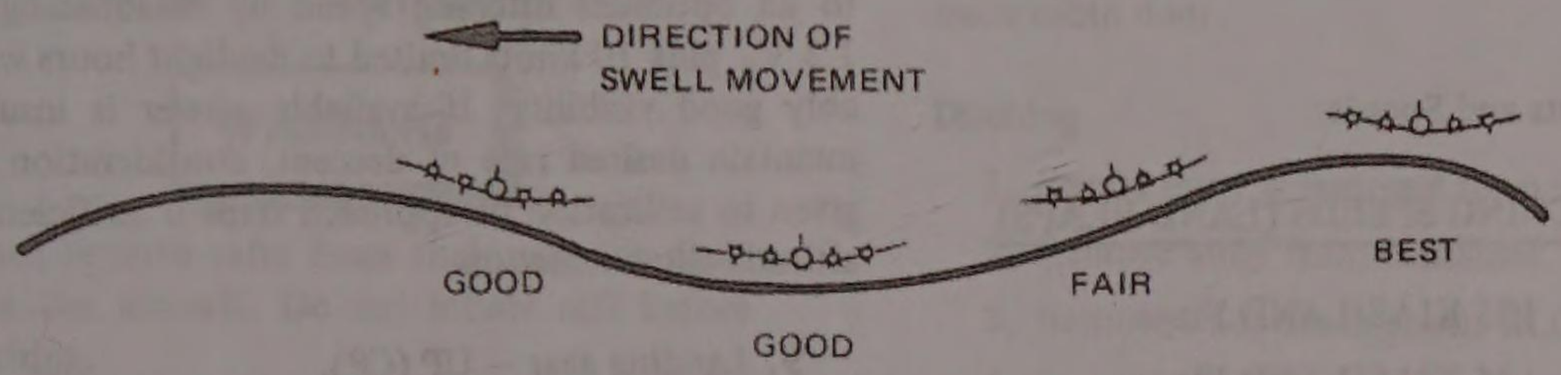


Figure 5-5. Selection of Ditching Heading by Evaluation of Sea and Wind

- If time permits, manually light, and leave in place, all cabin emergency exit lights (day or night) before ditching.

- Due to the added structural strength and the likelihood of flash fire on impact, emergency overwing exits shall not be removed until the aircraft has come to a complete stop.

2. Baro and radar altimeter – As required (CP).
3. Depressurize – As required (E).
4. Jettison – As required (P).

Note

If external or bomb bay stores are being carried, actuate the jettison switch and leave in the JETTISON position.

WARNING

- If the nature of the emergency indicates that hydraulic/electrical power may be lost during the jettison cycle, consideration should be given to utilizing WING ONLY JETTISON to preclude open bomb bay doors during ditching.

- If the bomb bay doors switch is positioned to OPEN prior to jettison, the bomb bay doors will automatically close at the appropriate time of the jettison programmer. If the bomb bay doors switch is left in the OPEN position when the jettison switch is turned OFF, the bomb bay doors will open.

- Do not select WING ONLY JETTISON with JETTISON switch actuated because the bomb bay doors will not close. The WING ONLY JETTISON switch interrupts the control of the bomb bay doors by the programmer module.

5. Ditch heading – Checked (CP).

Note

Ditch parallel to and near the crest of the swell unless there is a strong crosswind of 25 knots or more. If there is a strong crosswind, ditch into the wind, making contact on the upslope of the swell near the top. Wave motion is indicative of wind direction, but swell does not necessarily move with the wind. Conditions of water surface are indicative of wind speed. If visibility restricted, ditch heading may be determined from forecast data. The following may be helpful:

SURFACE CONDITION	WIND SPEED KNOTS
Few white crests	10 – 15
Many white crests	15 – 25
Streaks of foam from crests	25 – 35
Spray blown from top of waves	35 – 45

6. Ditching speed – Checked (CP, E).

Note

When calling out the ditching speed, the flight engineer shall give the land flap ditch speed. The pilot must add the proper correction if he elects to ditch in a different configuration. If limited to takeoff/approach flaps, increase ditching speeds by 5 KIAS, or if forced to use maneuver/flaps up, increase ditching speeds by 20 KIAS.

Representative Weights and Speeds:

WEIGHT	DITCHING SPEEDS (LAND FLAPS)
145,000	135 KIAS/LAND Flaps
140,000	134 KIAS/LAND Flaps
135,000	131 KIAS/LAND Flaps
130,000	129 KIAS/LAND Flaps
125,000	126 KIAS/LAND Flaps
120,000	124 KIAS/LAND Flaps
115,000	121 KIAS/LAND Flaps
110,000	119 KIAS/LAND Flaps
105,000	117 KIAS/LAND Flaps
100,000	114 KIAS/LAND Flaps
95,000	111 KIAS/LAND Flaps
90,000	108 KIAS/LAND Flaps
85,000	106 KIAS/LAND Flaps
80,000	103 KIAS/LAND Flaps
75,000	100 KIAS/LAND Flaps
70,000	97 KIAS/LAND Flaps

7. Emergency message/IFF – Emergency (CP).

Note

Copilot should attempt to establish UHF/VHF voice communications.

8. Flaps – As desired (CP).

Impaired directional controllability caused by engine loss or aileron damage is another factor to be considered in determining ditching feasibility. At lower gross weights, it is possible to attain an optimum ditching airspeed, desired rate of descent, and directional control by reducing power on the opposite symmetric engine. For three engine or two engine symmetric ditches, it is recommended that the aircraft be flown initially with approach flaps at the approach flap ditching airspeed. If sufficient time and altitude allow selection, at moderate and lower gross weights land flaps may be used, provided sufficient power and controllability exists. Two engine asymmetric ditch utilizing power on 100 fpm descent technique is not recommended. The lack of controllability due to high asymmetric power and ditch speed below 2 engine $V_{MC\ AIR}$ will make survivability unlikely. If a two engine asymmetric ditch is necessary, lateral control can be maintained at low powers with land flaps down to an optimum ditching speed by establishing a flare at 1.3 V_S plus 10 knots limited to daylight hours with reasonably good visibility. If available power is insufficient to maintain desired rate of descent, consideration should be given to utilization of approach flaps if sufficient time and altitude allow selection.

9. Landing gear – UP (CP).
10. AUX vent/outflow valve – Closed (E).
11. Harness – Locked (P, CP, E).

Note

If time permits, pilot, copilot, and engineer don helmets.

APPROACH TECHNIQUE.

In order to attain optimum impact conditions, adjust power during final stages of the approach to maintain a steady rate of descent of 100 fpm at ditch speed. Establish the final approach configuration early. The most favorable touchdown altitude will result from flying the configuration, rate of descent, and airspeeds recommended in this section. At touchdown, violent random movement of the power levers may occur. If the aircraft bounces on initial contact, keep the nose up.

EXITS.

The exits over the wings provide an added advantage for evacuating because the wings provide a pier from which the rafts may be boarded.

LPA-1A/2 FLOTATION ASSEMBLY.

The LPA-1A/2 is normally inflated by pulling both inflation assembly lanyards down and forward at the same time. For the LPA-1A, if the inflation assembly lanyards cannot be pulled at the same time, the lanyard on the right should be pulled first, so the collar lobe will be inflated first. If the collar lobes fail to inflate, the Velcro casing on the collar lobes should be opened by hand, then the two waist lobes

should be squeezed to force air into the collar lobes. To orally inflate, open casing, unfold flotation assembly, and inflate using the oral inflation tubes located on each waist lobe. Snap the hook on the right waist lobe to the D-ring on the left waist lobe.

LIFERAFTS.

Check to ensure that the liferaft painter (50 to 150 pound retaining line, 60 feet in length) is attached to the aircraft. Person launching raft should attach nylon launching strap to life vest, and push or lift liferaft through exit.

WARNING

Do not remove rafts from their carrying cases inside the aircraft. Do not inflate raft before launching.

Follow launching strap to the vicinity of the inflation assembly actuation handle located under the carrying case end flap. Pull actuation handle to inflate the raft. Leave the cotton painter attached to the aircraft.

CAUTION

Keep liferafts away from any damaged surfaces which might tear them.

Disperse personnel as equally as possible among exits selected for evacuation so there will be as little congestion as possible.

Note

Ditching station 15, 21, 22, 23, and sensor station 3 are assigned to liferaft No. 3.

Distribute emergency supplies (see figure 5-4) among the rafts, and tie them down in the center of the raft to prevent them from being lost in case the raft capsizes.

After all personnel have been evacuated (see figures 5-6 and 5-7), move rafts out from under any part of the aircraft which might strike them as it sinks. Rope the rafts together so that they will not drift apart and become separated, and complicate rescue. Remain in the vicinity of the aircraft as long as it remains afloat.

EMERGENCY SONOBUOY.

An SSQ-83 emergency (SAR) sonobuoy shall be stowed in the original unopened container, marked SAR, and secured vertically on the forward end of the sonobuoy storage rack, outboard of the emergency water breakers (see figure 5-4).

DEPLOYMENT

Bailout

1. Remove buoy from container.
2. Remove buoy from plastic SLC (if applicable).
3. Ensure rotor fins tape is removed.
4. Immediately prior to crew bailout, launch through main cabin door.

Ditching

1. Ensure buoy is removed from aircraft.
2. Remove buoy from container.
3. Remove buoy from plastic SLC (if applicable).
4. Remove rotochute as follows:

WARNING

Remain clear of the top of the buoy when removing the rotochute to avoid being struck by antenna.

CAUTION

Avoid damage to antenna by keeping it clear of debris, raft, or person. Damage to this assembly may cause loss of transmission.

a. To expose the microphone release the buttplate by striking the bottom sharply with a shoe or other similar object. The buttplate may also be released by loosening the two screws on the bottom using breakaway tool provided.

CAUTION

Do not completely remove screws.

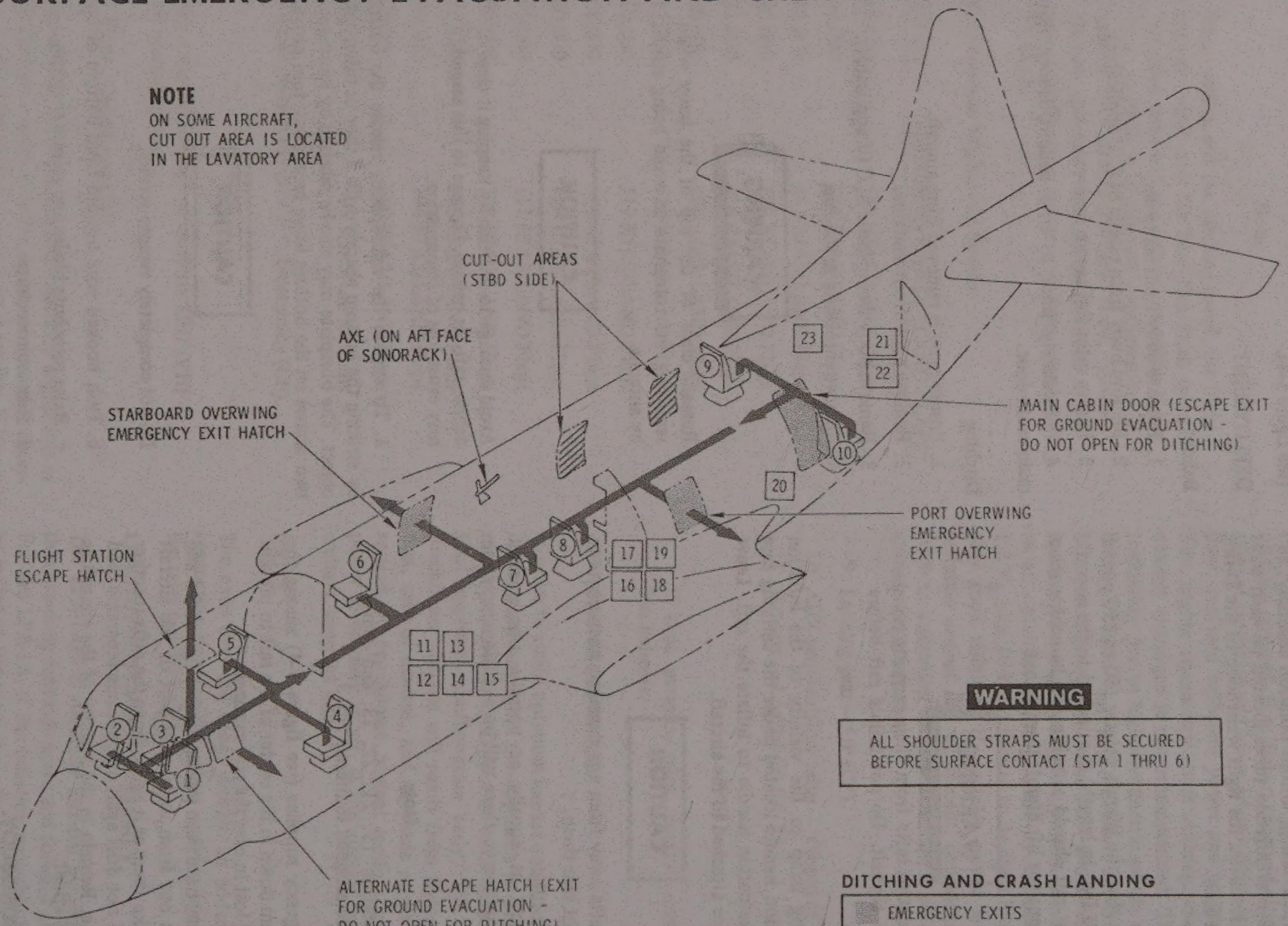
b. Push hooked wire upward from bottom of buoy.

c. Raise rotochute blades and release snap ring.

d. Remove rotochute.

5. Secure tether line to liferaft or person.
6. Place buoy in water.

SURFACE EMERGENCY EVACUATION AND CREW DITCHING STATIONS



WARNING

ALL SHOULDER STRAPS MUST BE SECURED BEFORE SURFACE CONTACT (STA 1 THRU 6)

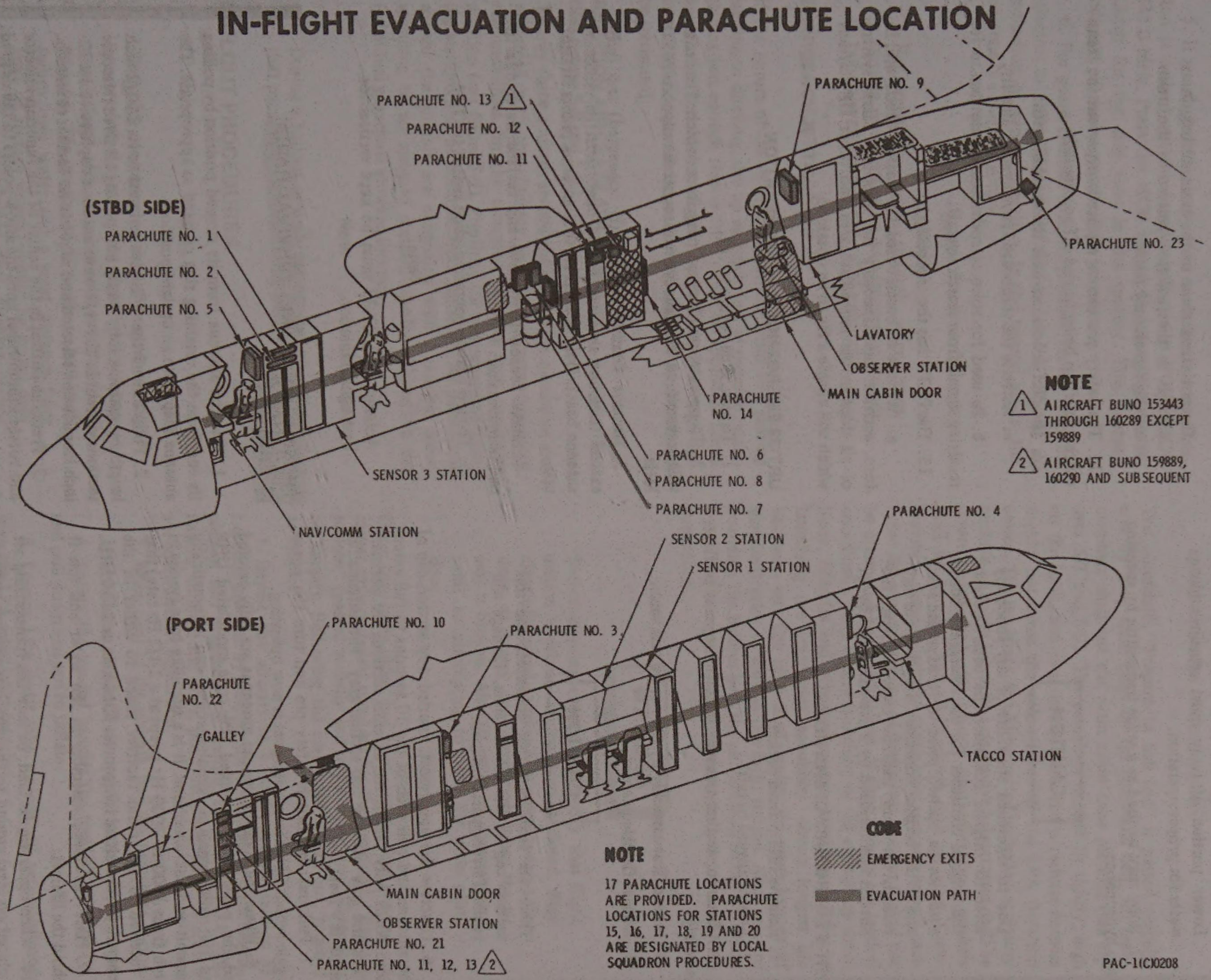
DITCHING AND CRASH LANDING

- EMERGENCY EXITS
- EVACUATION PATHS
- ALTERNATE DITCHING AND CRASH LANDING STATIONS
- NORMAL CREW DITCHING AND CRASH LANDING STATIONS

PAC-1(C)0207

Figure 5-6. Surface Emergency Evacuation and Crew Ditching Stations

IN-FLIGHT EVACUATION AND PARACHUTE LOCATION



NOTE

1 AIRCRAFT BUNO 153443 THROUGH 160289 EXCEPT 159889

2 AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT

NOTE

17 PARACHUTE LOCATIONS ARE PROVIDED. PARACHUTE LOCATIONS FOR STATIONS 15, 16, 17, 18, 19 AND 20 ARE DESIGNATED BY LOCAL SQUADRON PROCEDURES.

CODE

EMERGENCY EXITS

EVACUATION PATH

PAC-1(CI)0208

Figure 5-7. In-Flight Evacuation and Parachute Location

Note

Lower portion of buoy must remain under water for proper operation.

7. Buoy may be used as a voice transmitter by speaking into hydrophone.

CAUTION

Due to shortened shelf life of any sonobuoy after its original container has been opened, the original container for the emergency buoy shall not be opened prior to its expected use; and if the original container is opened for any reason, the buoy shall be removed from the aircraft and replaced by a new unopened buoy.

PRT-5 EMERGENCY OPERATION.

1. Remove PRT-5 from packet.

2. Attach lanyard to raft.

3. Check to see that transmitting set is secured to float assembly.

4. Inflate float assembly by CO_2 or by oral valve.

5. Release flexible antenna.

CAUTION

There are two parts that constitute the top section cap of the HF antenna. Damage will result if wrong part is turned.

6. Unscrew the uppermost, knurled, top section cap of the antenna and pull each of the 10 sections to full extension. When fully raised, the antenna sections are alternate black and gray with the top section gray. The antenna full length is 9 feet.

7. Pull out the switch safety pin and turn the power toggle switch ON. Transmitting set is now operating.

8. When the transmitting set antennas are fully erected and the power switch turned ON, tone modulated UHF and HF radio signals are simultaneously and automatically transmitted in all directions. It is a siren-like tone (varies in pitch from 1000 to 3000 Hz swept at a 2-1/2 Hz rate) that is received in any radio receiver tuned to either of the emergency transmitted frequencies 8364 kHz or 243.0 MHz.

9. Place the entire assembly in the water and tow it behind the liferaft.

10. When operating on land, be sure the transmitting set is placed on level ground so that the antennas are vertical.

Note

Do not stand close to the transmitting set as changes in the radiation pattern of the transmitting signals may result.

11. The safety pin can be replaced to prevent the transmitting set from being turned off accidentally.

12. The PRT-5 does not have the capability to:

a. Activate the shipboard alarm system directly.

b. Be used for voice or code communications or for receiving signals from search aircraft.

13. The PRT-5 has the capability to:

a. Activate a coastal-based DF station which will, in turn, activate simultaneously the shipboard alarm system of all ships in the immediate area and other DF stations which will enable a fix to be obtained.

URT-33 EMERGENCY RADIO OPERATION.

1. To arm, slide switch to ON.

2. To operate, pull lanyard plug from switch. The radio will transmit an emergency tone continuously on 243.0 MHz.

3. Remove flexible antenna (if connected) and fully extend telescope antenna (etched band must be visible at antenna base). Hold beacon so that antenna points straight up.

4. Shake beacon to remove any surface water due to rain or immersion.

5. To stop beacon operation, slide switch to OFF.

Note

Antenna of URT-33 must be kept vertical for best signal radiation.

PRC-90 DUAL-CHANNEL SURVIVAL RADIO OPERATION.

1. Free the antenna from its stowed position by pulling its end from the retaining ring or band as appropriate. The antenna snaps into an upright position.

2. Fully extend the 1/2-wave antenna to its 24-1/2 inch length by grasping it by its tip and pulling all five telescopic sections outward. The 1/4-wave antenna deploys to its 12-inch length when released and requires no further extension.

3. Press the button in the center of the function selector and rotate thumbwheel until the arrow points to the desired function.

4. To transmit voice, press and hold the press-to-talk button and speak directly into the microphone.

5. If guard channel steady tone or morse code transmission is desired, set the function selector to VOICE/MCW 243.0 MHz. Press the MCW button to transmit the tone. Listen for the side tone in the speaker. This sidetone indicates proper operation of the transmitter.

6. For guard channel beacon operation, set the function selector to BCN 243.0 MHz. Listen for the tone as an indication of proper operation. In the beacon mode, the sidetone is a chirping sound.

Note

For maximum signal strength when transmitting or receiving on any frequency, do not point the antenna directly at the aircraft.

EMERGENCY JETTISONING.

If the nature of the emergency permits, prior to a gear-up landing or ditching, use up as much fuel as possible, maintaining just enough reserve for a power-on approach. Loose equipment should be secured or jettisoned through the main cabin door. All external and bomb bay stores should be jettisoned.

ABANDON AIRCRAFT STATIONS.

(See figures 5-8 and 5-9.)

Twenty-three stations aboard the aircraft are numbered and placarded with the ditching and bailout procedures and responsibilities for the crewman manning each particular position (see figure 5-9). Priorities for assignment of ditching stations may be obtained from figure 5-8. All parachutes aboard the aircraft are designated with a number corresponding to an assigned station, usually painted on the individual parachute stowage location.

Note

During a bailout or drill, personnel shall utilize that parachute assigned during the brief.

BAILOUT PROCEDURES.

Note

Thorough consideration should be given to the consequences of scattering flight crewmembers over a large area of ocean without benefit of liferafts. The command "Prepare to bail out" (when over water and a great distance from land or surface vessels) should be issued only after it is determined that ditching cannot be safely accomplished. Bailout should be conducted with the aircraft circling to avoid widespread separation of crewmembers.

The command, "Prepare to bail out" is passed verbally and by four short rings on the command bell. All crewmembers shall use the main cabin door for exit (see figures 5-7 and 5-9). The parachute should fit tightly; high on the back, and snug in the seat. The parachute harness should not cross the collar lobes of the LPA flotation device. The leg straps should be routed under the accessory packets on lower lobes. The protective helmet visor shall be down and locked. All objects protruding from pockets shall be removed and flight gloves shall be worn. Crewmembers should assemble at the sono area and inspect each other for proper donning of equipment. Bailout should not be attempted below 1000 feet. If time permits the tactical coordinator shall ensure launching of the emergency sonobuoy, liferafts and other emergency equipment. Prior to launching the emergency sonobuoy, ensure longest life has been set. The pilot shall deploy the crash locator (if installed) prior to leaving the flight station. Also, prior to sounding the bailout bell, the aircraft shall be depressurized by the flight engineer following emergency depressurization procedures.

WARNING

Before opening cabin door, verify that flight station overhead smoke door is closed. Stay clear of marked caution area when opening the door, as it may open explosively when the air seal is broken. Aircraft must be depressurized prior to attempting to open the main cabin door.

Once the cabin door has been opened and secured, all crewmembers should stand by for the command, "Execute bailout" (passed verbally and by one long ring, 10 seconds or longer). Following the command to bail out, proceed as follows:

1. Depart the aircraft in a quick, orderly fashion at 1-second intervals by grasping the door edges at waist height, placing feet together and exiting by pulling forcefully. Passing through the door, push back and away to ensure adequate aircraft separation.

2. When clear of the aircraft, pull the parachute D-ring.

3. Check the parachute canopy for proper deployment.

4. Locate the beaded handles (or toggles) on the LPA and pull down and out to inflate.

5. Loosen LPA waist lobe material (if necessary) and snap the LPA waist lobes together.

PRIORITY OF DITCHING STATION ASSIGNMENT

NUMBER OF CREWMEMBERS ABOARD	1 PILOT	2 COPILOT	3 FLIGHT ENGINEER	4 TACCO	5 NAVCOMMO	6 SENSOR 3	7 SENSOR 1	8 SENSOR 2	9 ORDNANCE	10 FLIGHT DECK	11	12	13	14	15	16	17	18	19	20	21	22	23
A 4		1							3														
	X	X	X						X														
A 5		1							3														
	X	X	X						X	X													
A 6		1																					
	X	X	X					X	X	X													
7		1																					
	X	X	X	X				X	X	X													
8																							
	X	X	X	X		X	X	X	X	X											X	X	X
9	X	X	X	X	X		X	X	X	X											X	X	X
10	X	X	X	X	X	X	X	X	X	X											X	X	X
11	X	X	X	X	X	X	X	X	X	X											X	X	X
12	X	X	X	X	X	X	X	X	X	X											X	X	X
13	X	X	X	X	X	X	X	X	X	X											X	X	X
14	X	X	X	X	X	X	X	X	X	X	X										X	X	X
15	X	X	X	X	X	X	X	X	X	X	X	X									X	X	X
16	X	X	X	X	X	X	X	X	X	X	X	X	X								X	X	X
17	X	X	X	X	X	X	X	X	X	X	X	X	X	X							X	X	X
18	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X					X	X	X
19	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X				X	X	X
20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X
21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X
22	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
23	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

NOTES:

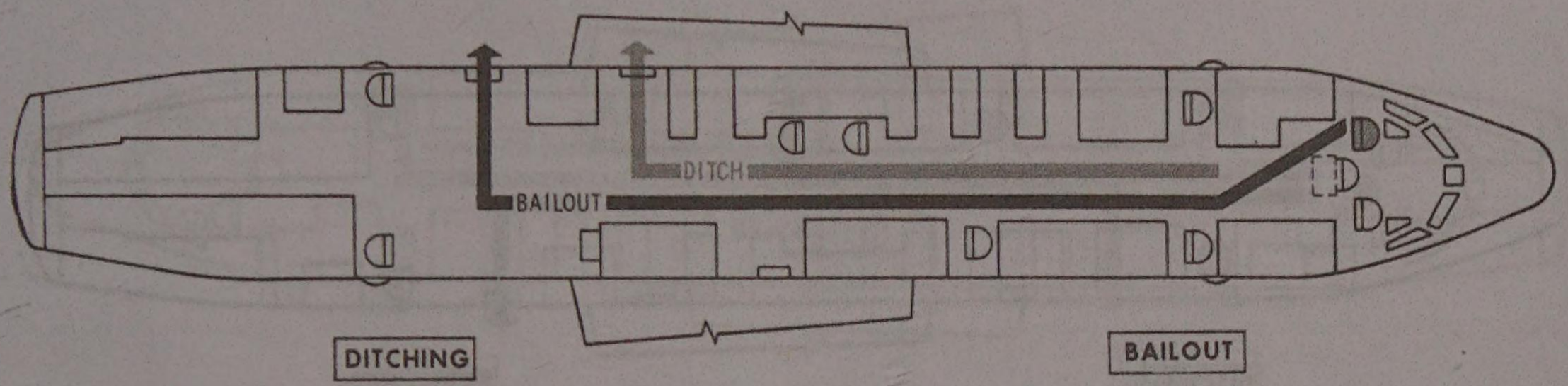
1. Take emergency buoy
2. Take water breaker
3. Launch No. 1 liferaft

A. All aboard No. 1 liferaft with 7 or less crewmen.

Figure 5-8. Priority of Ditching Station Assignment

DITCHING & BAILOUT PROCEDURES

CREW STATION 1 (PILOT)



POSITION: IN SEAT AT CONTROLS

1 WARN CREW: "PREPARE TO DITCH" TIME TO IMPACT, JETTISON BOMB LOADS. ADJUST SEAT BELT AND SHOULDER HARNESS

2. RECEIVE ACKNOWLEDGEMENT FROM TACCO OF CREW PREPAREDNESS

3 CHECK CREW EVACUATION: EXIT THROUGH OVERHEAD HATCH OR PORT OVERWING HATCH. BOARD NO. 1 LIFERAFT

1 GIVE SIGNAL FOR BAILOUT PREPARATION ON COMMAND BELL (FOUR SHORT RINGS) AND ON INTERPHONE USING P.A. FUNCTION

3 REDUCE AIRSPEED IF POSSIBLE

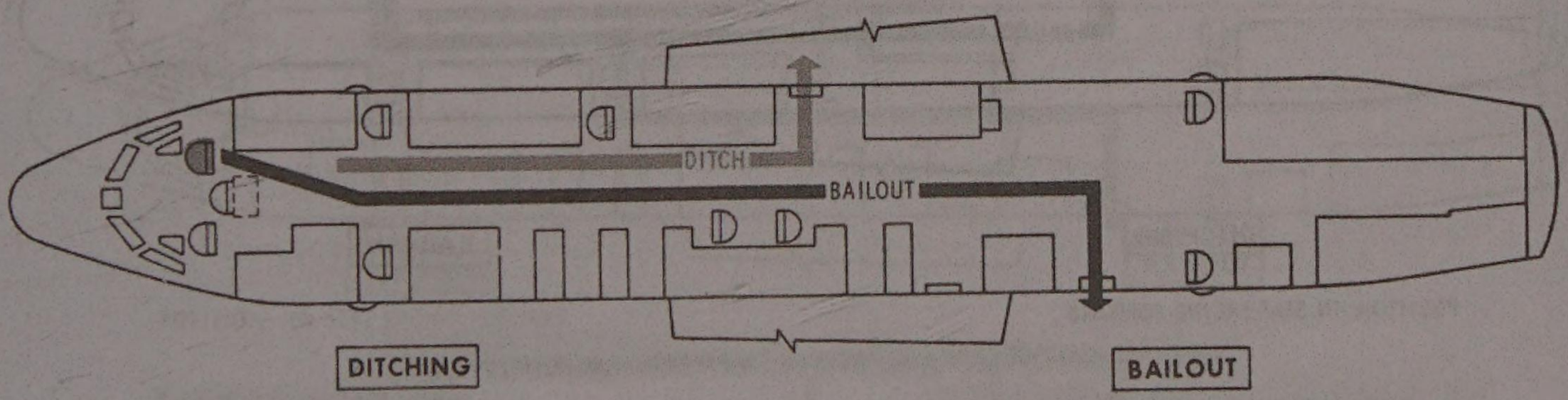
4 DEPRESSURIZE AIRCRAFT AND TRIM SLIGHTLY NOSE DOWN.

5 HEAD AIRCRAFT TOWARD UNINHABITED AREA AND ENGAGE AUTOPILOT. IF OVER WATER OR UNINHABITED AREA, ESTABLISH PORT TURN AND ENGAGE AUTOPILOT

6 GIVE SIGNAL TO BAILOUT OVER INTERPHONE AND SOUND ONE LONG RING ON THE COMMAND BELL

7 BAILOUT THROUGH MAIN CABIN DOOR

CREW STATION 2 (COPILOT)



POSITION: IN SEAT AT CONTROLS

1 SET IFF TO EMERGENCY

2 ANNOUNCE ALTITUDE OVER P.A. AND OVERRIDE

3 ESTABLISH VOICE COMMUNICATION IF POSSIBLE

4 ADJUST SEAT BELT AND SHOULDER HARNESS

5 AFTER STOP EXIT THROUGH OVERHEAD HATCH OR STARBOARD OVERWING HATCH BOARD NO. 2 LIFERAFT

4 ASSIST PILOT AS DIRECTED

5 DEPLOY CRASH RECORDER

6 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

CODE

DITCHING STATION AND EXIT ROUTE

BAILOUT EXIT ROUTE

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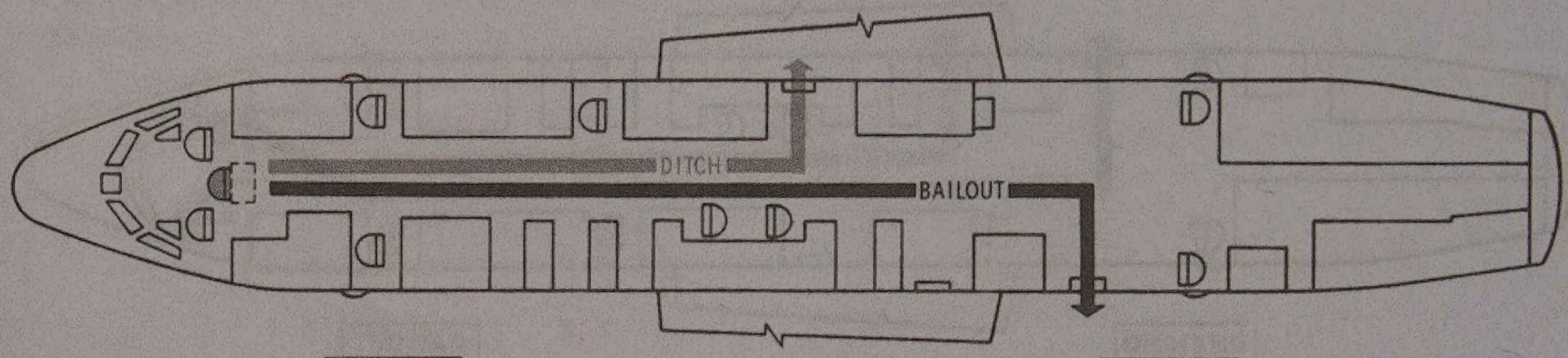
Figure 5-9. Ditching and Bailout Procedures (Sheet 1 of 9)

DITCHING & BAILOUT PROCEDURES

CREW STATION 3 (FLIGHT ENGINEER)



DITCHING

POSITION: IN SEAT

1 ADJUST SEAT BELT AND SHOULDER HARNESS

2 DEPRESSURIZE: DUMP COMPRESSORS, CLOSE AUX VENT AND OUT FLOW VALVE

3 OPEN OVERHEAD HATCH (IF NOT SUBMERGED) TAKE FLASHLIGHT, EXIT OVER WING ON STARBOARD SIDE, OR THROUGH OVERHEAD HATCH AND BOARD NO. 2 LIFERAFT

BAILOUT

1 ACKNOWLEDGE BAILOUT PREPARATION SIGNAL (GIVEN VERBALLY AND FOUR SHORT RINGS ON COMMAND BELL BY PILOT)

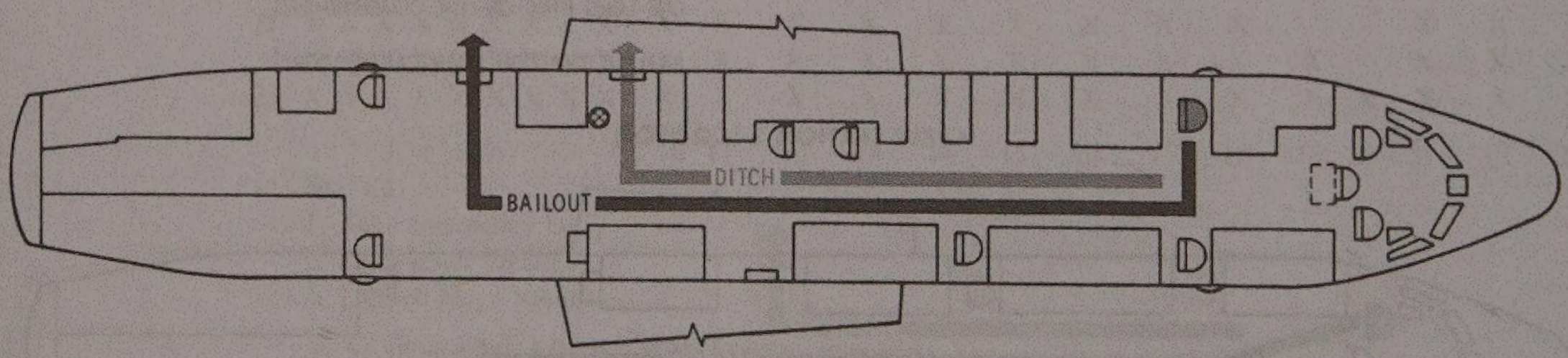
2 DEPRESSURIZE: DUMP COMPRESSORS, OPEN OUTFLOW VALVE, CLOSE AUX VENT

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

INSPECT FORWARD ELECTRICAL LOAD CENTER IF NOT OTHERWISE ASSIGNED

CREW STATION 4 (TACCO)



DITCHING

POSITION: IN SEAT FACING FORWARD

1 ACKNOWLEDGE COMMAND, ASSURE CREW PREPARED AND NOTIFY PILOT

2 SECURE CLASSIFIED MATERIAL AND LOOSE EQUIPMENT

3 TAKE DITCHING STATION, ADJUST SEAT BELT AND SHOULDER HARNESS

4 AFTER STOP, DIRECT CREW EXIT AND REMOVAL OF SURVIVAL GEAR THROUGH PORT OVERWING TAKE PORT FIRST AID KIT. BOARD NO. 1 LIFERAFT

BAILOUT

1 ACKNOWLEDGE COMMAND, ASSURE CREW PREPARED AND NOTIFY PILOT

2 ENSURE CHANNEL 15 BUOY AND LIFERAFTS ARE LAUNCHED, IF TIME PERMITS

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

DIRECT CREW EFFORT IN LOCATING AND FIGHTING FIRE. DIRECT REMAINING CREW WITH UNASSIGNED DUTIES TO ASSIST AS REQUIRED. (I.E., OBTAIN OXYGEN BOTTLES, TAKE MESSAGES TO FLIGHT STATION, ETC). CONTINUOUSLY REPORT PROGRESS AND RESULTS TO FLIGHT STATION

CODE

DITCHING STATION AND EXIT ROUTE

BAILOUT EXIT ROUTE

⊗ LOCATION OF EQUIPMENT ASSIGNED FOR DITCHING

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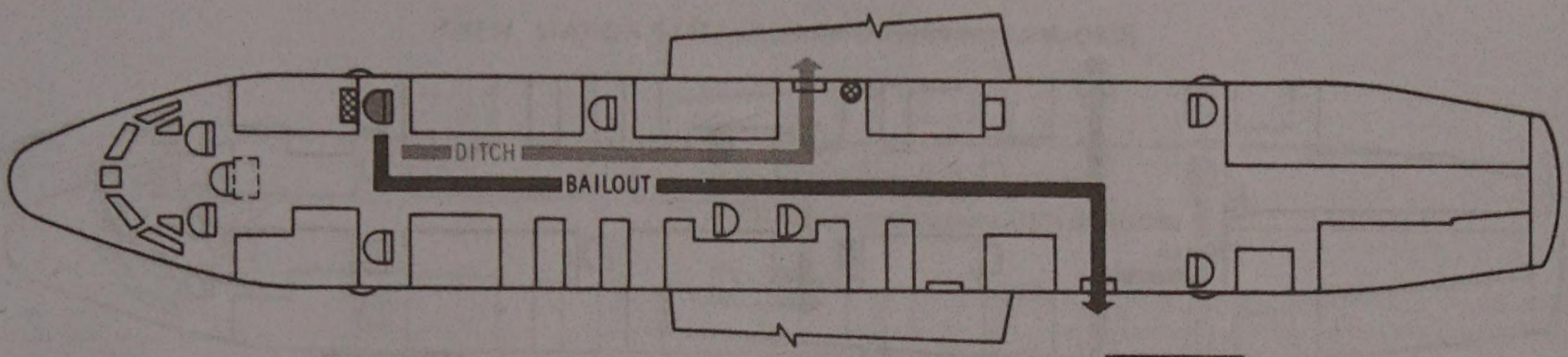
Figure 5-9. Ditching and Bailout Procedures (Sheet 2 of 9)

DITCHING & BAILOUT PROCEDURES

CREW STATION 5 (NAV/COMM)



DITCHING

POSITION: IN SEAT FACING FORWARD

1 SEND POSITION REPORTS AND DISTRESS SIGNALS. SELECT TTY ON COMMUNICATIONS SELECTOR PANEL AND DIR/SEND ON TELETYPWRITER KEYBOARD TRANSMITTER

2 SECURE LOOSE EQUIPMENT AND CLASSIFIED MATERIAL

3 ADJUST SEAT BELT AND SHOULDER HARNESS

4 AFTER STOP, DIRECT CREW EXIT AND REMOVAL OF SURVIVAL GEAR THROUGH STARBOARD OVERWING HATCH. TAKE MAPS, REPORTS, AND EMERGENCY BUOY. BOARD NO. 2 LIFERAFT

BAILOUT

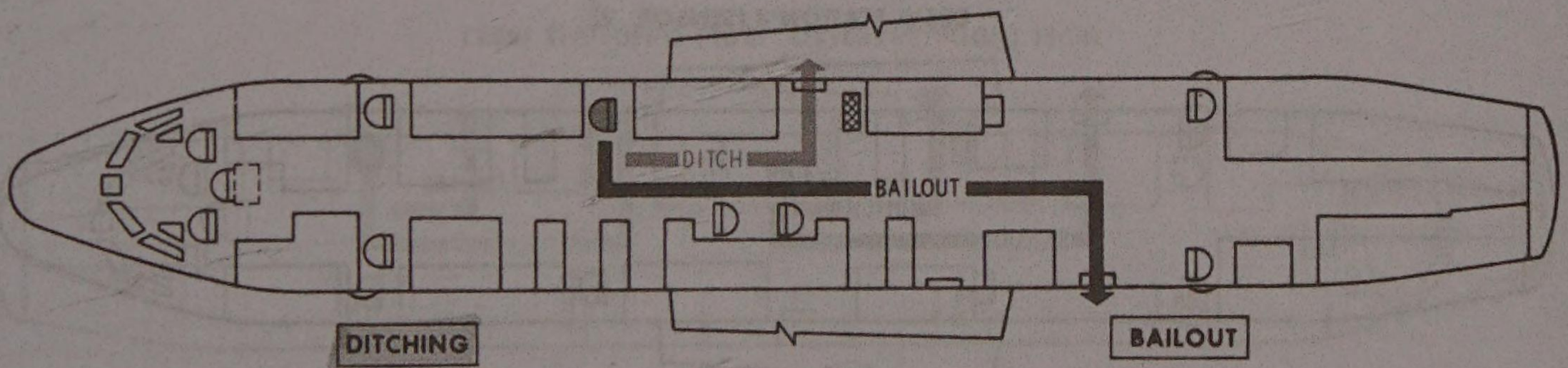
2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR.

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

REMAIN AT STATION. INSPECT ARO POWER SUPPLIES. BE PREPARED TO PULL APPLICABLE CIRCUIT BREAKERS. REPORT PROGRESS TO TACCO. OBTAIN AIRCRAFT POSITION, DRAFT EMERGENCY MESSAGE, AND BE PREPARED TO PROVIDE HEADING TO NEAREST LAND.

CREW STATION 6 (SENSOR 3)



DITCHING

POSITION: IN SEAT FACING FORWARD

1 GIVE BEARING AND DISTANCE TO NEAREST SHIP OR CLOSEST POINT OF LAND.

2 SECURE LOOSE EQUIPMENT

3 TAKE DITCHING STATION, ADJUST SEAT BELT AND SHOULDER HARNESS

4 AFTER STOP, LAUNCH NO. 3 LIFERAFT, EXIT OVERWING STARBOARD SIDE, BOARD NO. 3 LIFERAFT.

BAILOUT

2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

IF POSSIBLE, GIVE RANGE AND BEARING TO NEAREST SHIP OR CLOSEST POINT OF LAND. INSPECT ELECTRONIC RACKS C1, 2, 3, 4, AND 5 BE PREPARED TO PULL APPLICABLE CIRCUIT BREAKERS AS REQUIRED. REPORT PROGRESS TO TACCO

CODE

DITCHING STATION AND EXIT ROUTE

BAILOUT EXIT ROUTE

LOCATION OF EQUIPMENT ASSIGNED FOR DITCHING

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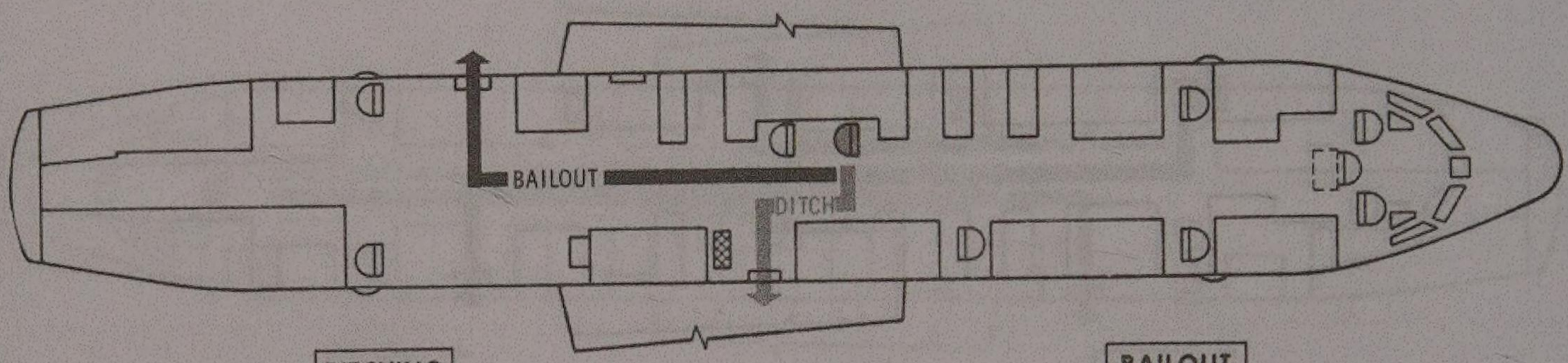
Figure 5-9. Ditching and Bailout Procedures (Sheet 3 of 9)

DITCHING & BAILOUT PROCEDURES

CREW STATION 7 (SENSOR 1)



DITCHING

POSITION: IN SEAT FACING AFT

1 SECURE LOOSE EQUIPMENT

2 TURN ON STARBOARD OVERWING EXIT LIGHT

3 TAKE DITCHING STATION AND ADJUST SEAT BELT

4 AFTER STOP, JETTISON STARBOARD OVERWING HATCH. LAUNCH NO. 2 LIFERAFT; EXIT OVERWING STARBOARD SIDE: BOARD NO. 2 LIFERAFT

BAILOUT

1 TURN ON STARBOARD OVERWING EMERGENCY EXIT LIGHT

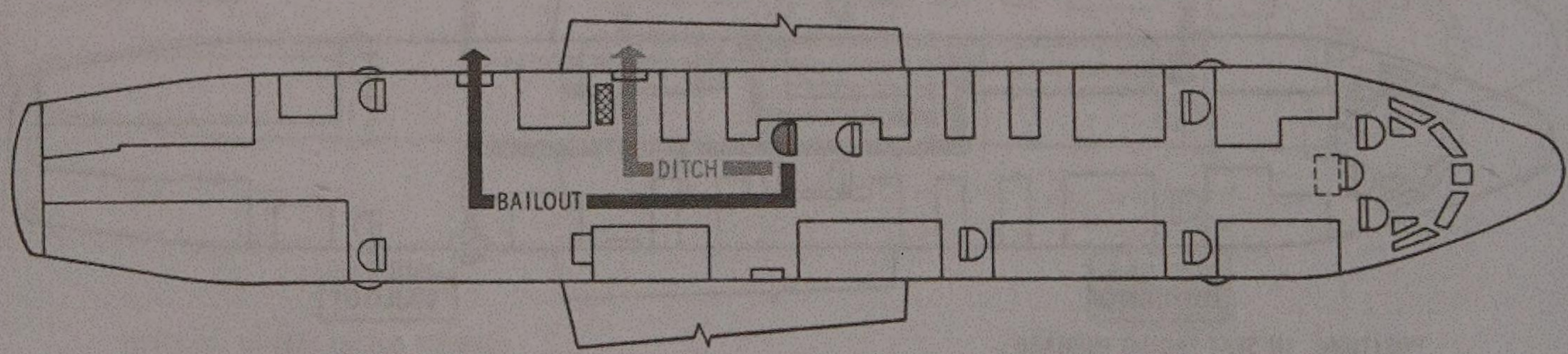
2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

ACTIVATE STARBOARD OVERWING EXIT LIGHT, INSPECT THE MAIN LOAD CENTER, ELECTRONICS RACKS F1 AND 2, AND HF-2 COUPLER. INSPECT BENEATH SS-1 AND SS-2 STATIONS. BE PREPARED TO PULL APPLICABLE CIRCUIT BREAKERS AS REQUIRED. REPORT PROGRESS TO TACCO

CREW STATION 8 (SENSOR 2)



DITCHING

POSITION: IN SEAT FACING AFT

1 SECURE LOOSE EQUIPMENT

2 TURN ON PORT OVERWING EXIT LIGHT

3 TAKE DITCHING STATION AND ADJUST SEAT BELT

4 AFTER STOP, JETTISON PORT OVERWING HATCH. LAUNCH NO. 1 LIFERAFT; EXIT OVERWING PORT SIDE, BOARD NO. 1 LIFERAFT

CODE

DITCHING STATION AND EXIT ROUTE

BAILOUT EXIT ROUTE

LOCATION OF EQUIPMENT ASSIGNED FOR DITCHING

BAILOUT

1 TURN ON PORT OVERWING EMERGENCY EXIT LIGHT

2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR.

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

ACTIVATE PORT OVERWING EXIT LIGHT, OBTAIN FIRE BOTTLE AT END OF SONOBUOY STORAGE RACK, INSPECT ELECTRONICS RACKS E1; AND 2; G1 AND 2; AND HYDRAULIC SERVICE CENTER. BE PREPARED TO PULL APPLICABLE CIRCUIT BREAKERS AS REQUIRED. REPORT PROGRESS TO TACCO.

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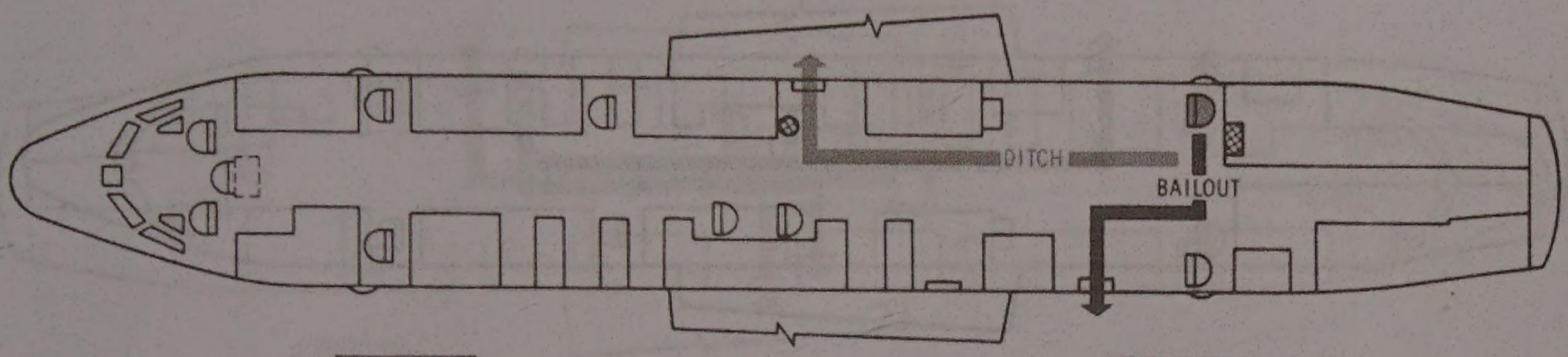
Figure 5-9. Ditching and Bailout Procedures (Sheet 4 of 9)

DITCHING & BAILOUT PROCEDURES

CREW STATION 9 (STARBOARD OBSERVER/ARM-ORD)



DITCHING

POSITION: IN SEAT FACING AFT

1 SECURE LOOSE EQUIPMENT IN AFT PORTION OF AIRCRAFT

2 TURN ON MAIN CABIN DOOR EXIT LIGHT

3 TAKE DITCHING STATION AND ADJUST SEAT BELT

4 AFTER STOP, TAKE WATER BREAKER FROM HEAD AND STARBOARD FIRST AID KIT

5 EXIT STARBOARD OVERWING HATCH. BOARD NO. 2 LIFERAFT

BAILOUT

1 TURN ON MAIN CABIN DOOR EMERGENCY EXIT LIGHT

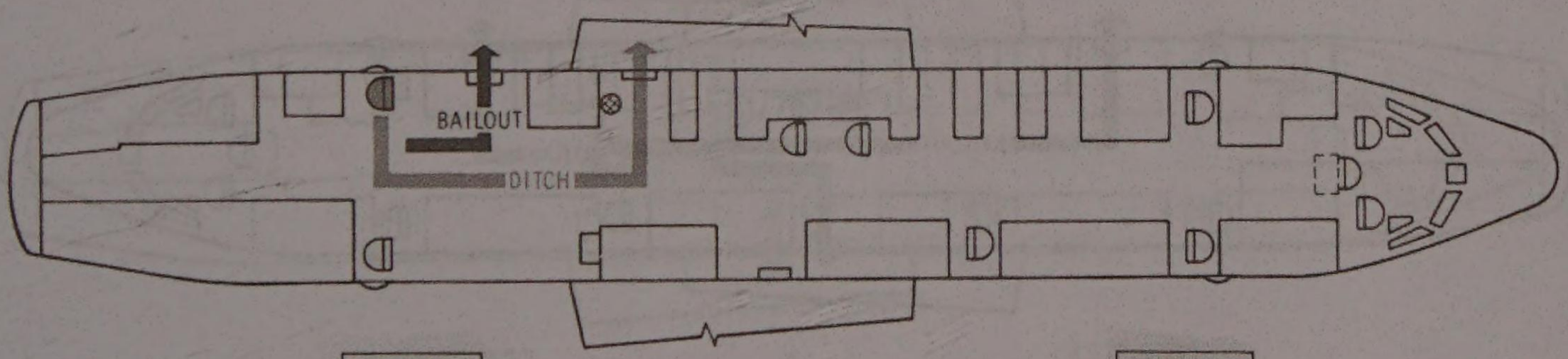
2 WHEN PREPARED TO BAIL OUT, ASSEMBLY IN FRONT OF MAIN CABIN DOOR

3 BAIL OUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

ACTIVATE MAIN CABIN DOOR EXIT LIGHT, OBTAIN AFT FIRE BOTTLE, INSPECT ALL ELECTRONIC RACKS AFT OF MAIN CABIN DOOR, GALLEY, DEICER CONTROL PANEL, DOPPLER WELL, AND TOP STROBE LIGHT POWER SUPPLY IN OVERHEAD. BE PREPARED TO PULL APPLICABLE CIRCUIT BREAKERS AS REQUIRED. REPORT PROGRESS TO TACCO.

CREW STATION 10 (PORT OBSERVER/FLIGHT TECH)



DITCHING

POSITION: IN SEAT FACING AFT

1 SECURE LOOSE EQUIPMENT IN AFT PORTION OF AIRCRAFT

2 TAKE DITCHING STATION AND ADJUST SEAT BELT

3 AFTER STOP, TAKE PORT EMERGENCY WATER BREAKER AND EXIT PORT OVERWING HATCH. BOARD NO. 1 LIFERAFT

BAILOUT

1 WHEN PREPARED TO BAIL OUT, ASSEMBLY IN FRONT OF MAIN CABIN DOOR

2 BAIL OUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

OBTAIN FORWARD FIRE BOTTLE, INSPECT ELECTRONICS RACKS A1 AND 2; B1, 2 AND 3; D1, 2 AND 3; HF-1 COUPLER; AND A350 ICS ISOLATION BOX IN OVERHEAD BETWEEN TACCO AND NAV/COMM. BE PREPARE TO PULL APPLICABLE CIRCUIT BREAKERS AS REQUIRED. REPORT PROGRESS TO TACCO.

CODE

DITCHING STATION AND EXIT ROUTE

BAILOUT EXIT ROUTE

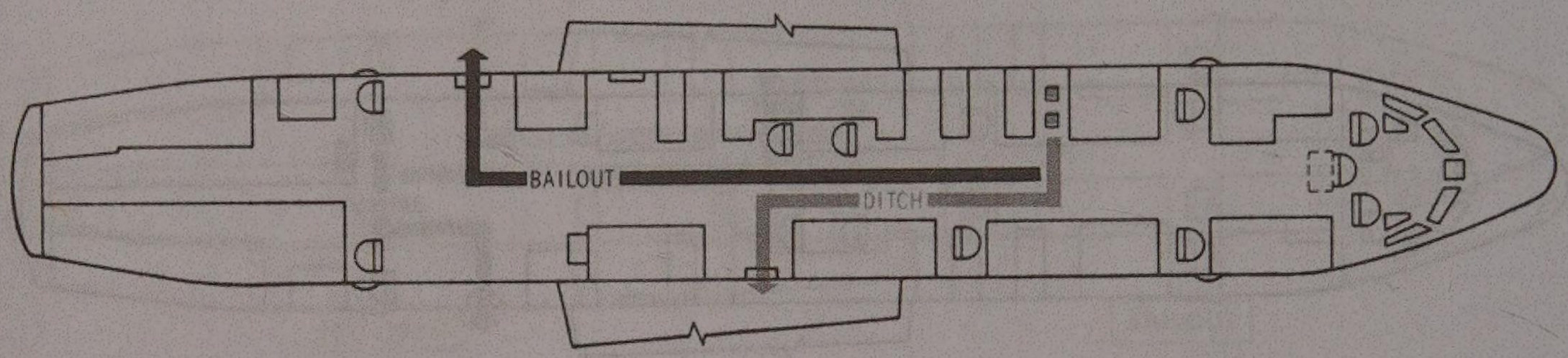
LOCATION OF EQUIPMENT ASSIGNED FOR DITCHING

PAC-1(C)0033

Figure 5-9. Ditching and Bailout Procedures (Sheet 5 of 9)

DITCHING & BAILOUT PROCEDURES

STATION 11 & 12



DITCHING

POSITION: ON AUXILIARY SEAT FACING AFT

1 SECURE LOOSE EQUIPMENT

2 TAKE DITCHING STATION AND ADJUST SEAT BELT

3 AFTER STOP, EXIT STARBOARD OVERWING HATCH BOARD NO. 2 LIFERAFT

NOTE

STATION 11 TAKE PARACHUTE

BAILOUT

1 UPON RECEIPT OF PREPARATORY COMMAND (VERBAL AND 4 SHORT RINGS) PUT ON PARACHUTE

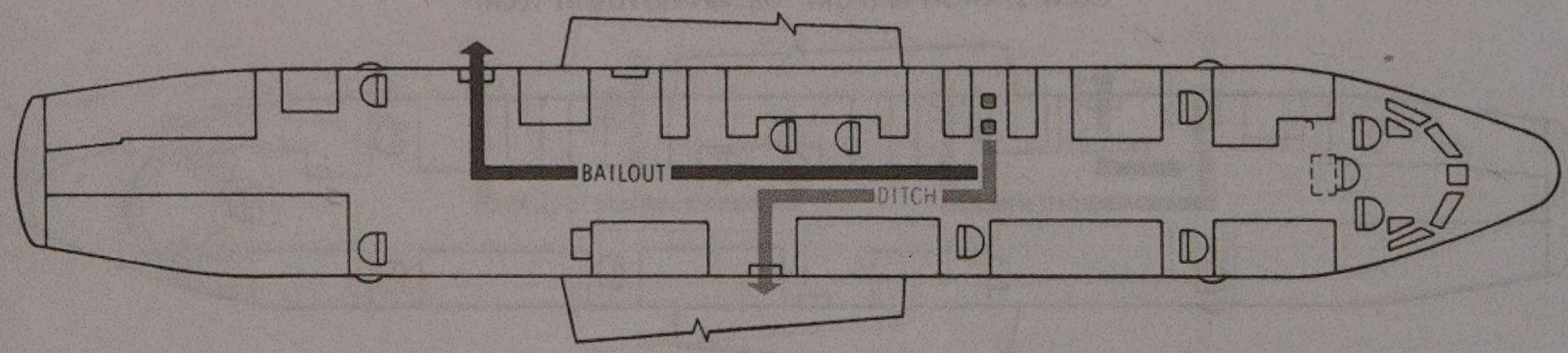
2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR

3. BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

AS ASSIGNED OR DIRECTED BY TACCO

STATION 13 & 14



DITCHING

POSITION: ON AUXILIARY SEAT FACING AFT

1 SECURE LOOSE EQUIPMENT

2 TAKE DITCHING STATION AND ADJUST SEAT BELT

3 AFTER STOP EXIT STARBOARD OVERWING HATCH BOARD NO 2 LIFERAFT

CODE

DITCHING STATION AND EXIT ROUTE

BAILOUT EXIT ROUTE

BAILOUT

1 UPON RECEIPT OF PREPARATORY COMMAND (VERBAL AND 4 SHORT RINGS) PUT ON PARACHUTE

2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

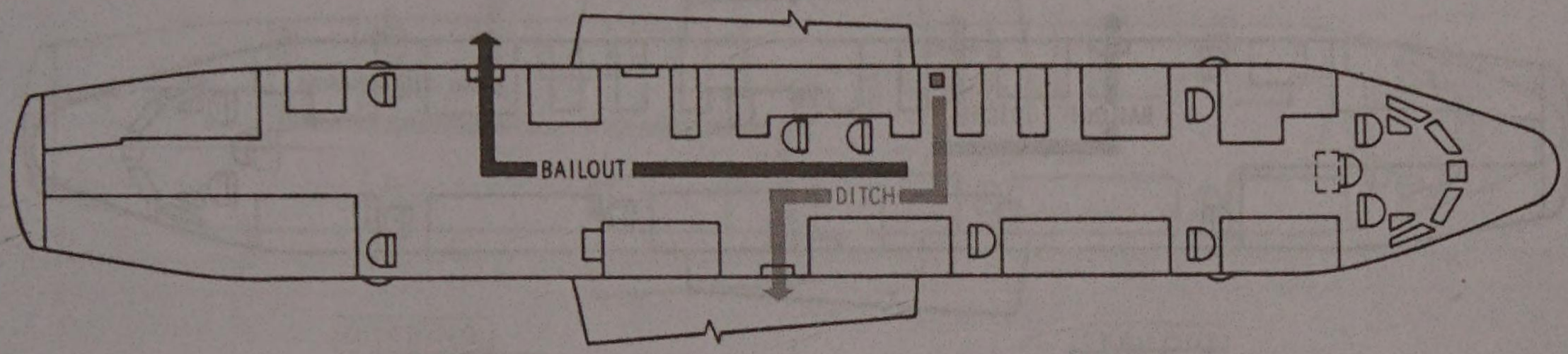
AS ASSIGNED OR DIRECTED BY TACCO.

PAC-1(C)0065

Figure 5-9. Ditching and Bailout Procedures (Sheet 6 of 9)

DITCHING & BAILOUT PROCEDURES

STATION 15



DITCHING

POSITION: ON AUXILIARY SEAT FACING AFT

1 SECURE LOOSE EQUIPMENT

2 TAKE DITCHING STATION AND ADJUST SEAT BELT

3 AFTER STOP, EXIT STARBOARD OVERWING HATCH. BOARD NO. 3 LIFERAFT

BAILOUT

1 UPON RECEIPT OF PREPARATORY COMMAND (VERBAL AND 4 SHORT RINGS) PUT ON PARACHUTE

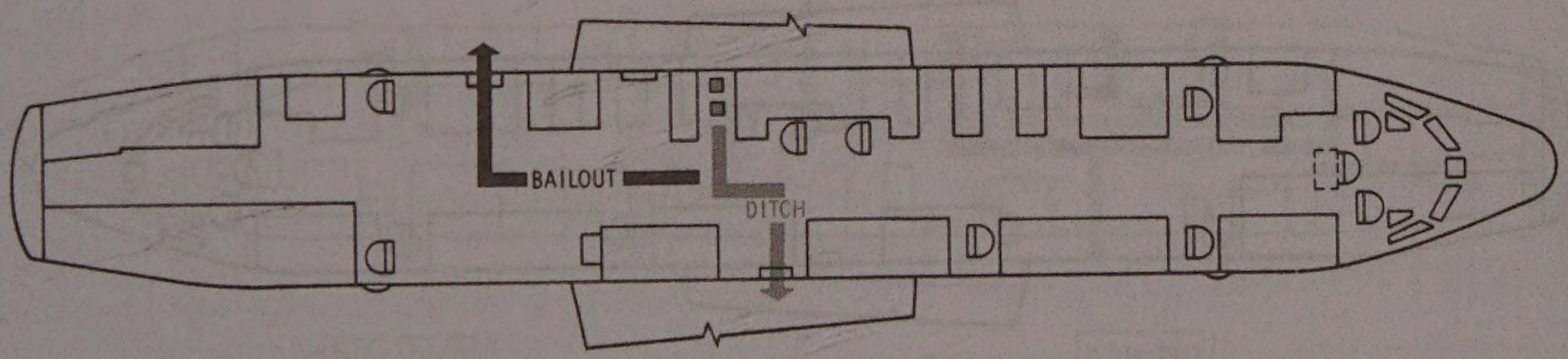
2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

AS ASSIGNED OR DIRECTED BY TACCO.

STATION 16 & 17



DITCHING

POSITION: ON AUXILIARY SEAT FACING AFT

1 SECURE LOOSE EQUIPMENT

2 TAKE DITCHING STATION AND ADJUST SEAT BELT

3 AFTER STOP, EXIT STARBOARD OVERWIND HATCH. BOARD NO. 2 LIFERAFT

CODE

DITCHING STATION AND EXIT ROUTE

BAILOUT EXIT ROUTE

BAILOUT

1 UPON RECEIPT OF PREPARATORY COMMAND (VERBAL AND 4 SHORT RINGS) PUT ON PARACHUTE

2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

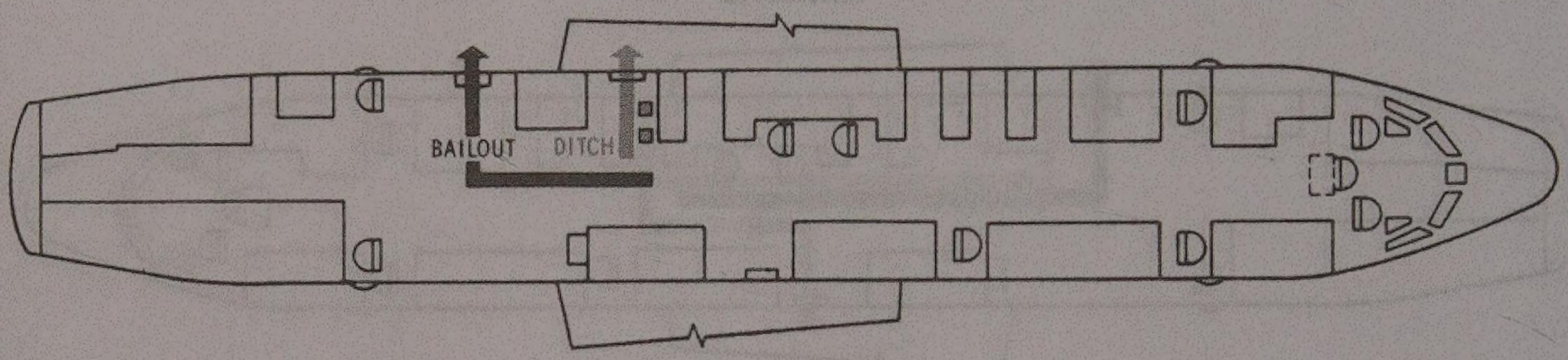
AS ASSIGNED OR DIRECTED BY TACCO

PAC-1(B12)0066

Figure 5-9. Ditching and Bailout Procedures (Sheet 7 of 9)

DITCHING & BAILOUT PROCEDURES

STATION 18 & 19



DITCHING

POSITION: ON DECK FACING AFT

1 SECURE LOOSE EQUIPMENT

2 TAKE DITCHING STATION AND ADJUST SEAT BELT

3 AFTER STOP, EXIT PORT OVERWING HATCH. BOARD NO. 1 LIFERAFT.

NOTE:

STATION 18 TAKE PARACHUTE

BAILOUT

1 UPON RECEIPT OF PREPARATORY COMMAND (VERBAL AND 4 SHORT RINGS) PUT ON PARACHUTE

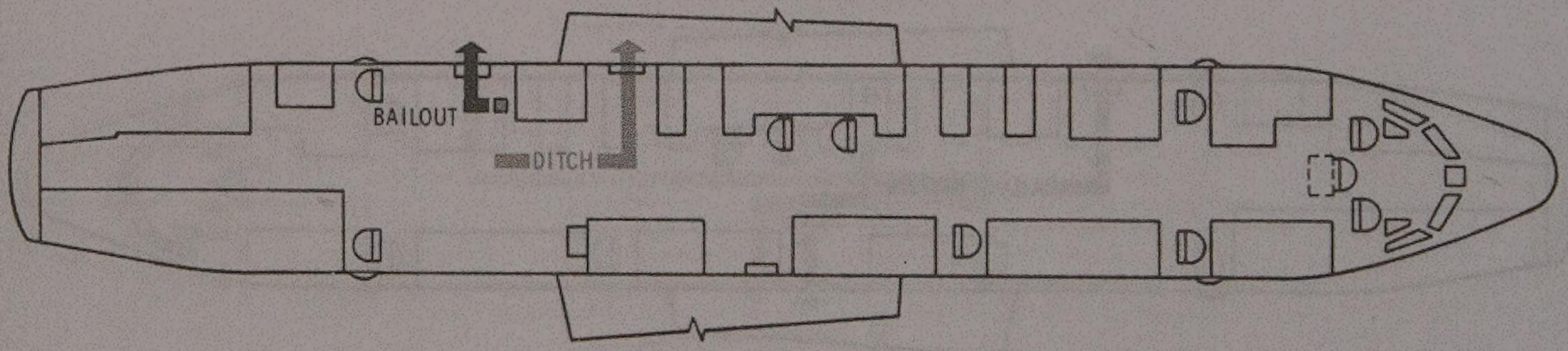
2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

AS ASSIGNED OR DIRECTED BY TACCO

STATION 20



DITCHING

POSITION: ON DECK FACING AFT

1 SECURE LOOSE EQUIPMENT

2 TAKE DITCHING STATION AND ADJUST SEAT BELT

3 AFTER STOP, EXIT PORT OVERWING HATCH. BOARD NO. 1 LIFERAFT.

CODE

DITCHING STATION AND EXIT ROUTE

BAILOUT EXIT ROUTE

BAILOUT

1 UPON RECEIPT OF PREPARATORY COMMAND (VERBAL AND 4 SHORT RINGS) PUT ON PARACHUTE

2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

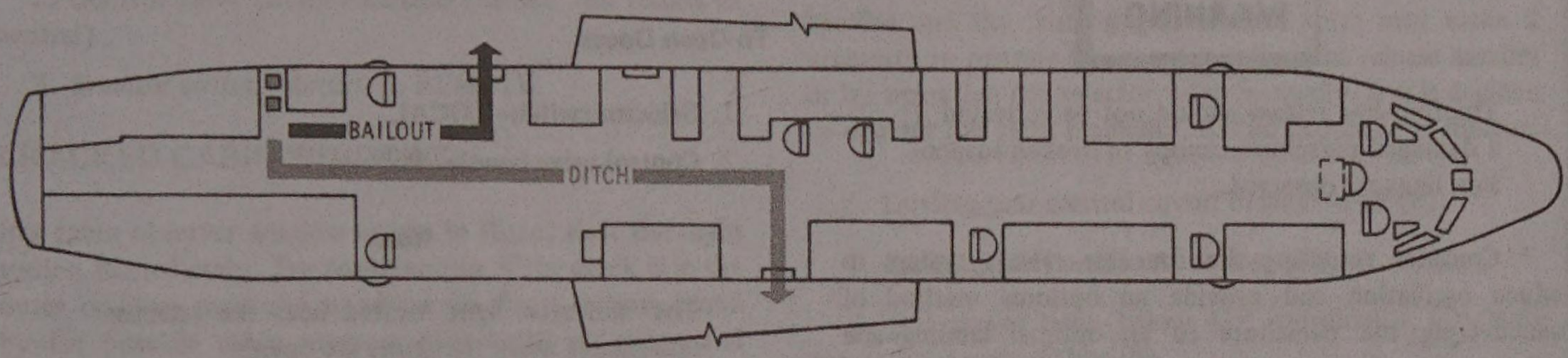
AS ASSIGNED OR DIRECTED BY TACCO

PAC-1(B1210067

Figure 5-9. Ditching and Bailout Procedures (Sheet 8 of 9)

DITCHING & BAILOUT PROCEDURES

STATION 21 & 22



DITCHING

POSITION: IN SEAT FACING AFT

1 SECURE LOOSE EQUIPMENT

2 TAKE DITCHING STATION AND ADJUST SEAT BELT

3 AFTER STOP, EXIT STARBOARD OVERWING HATCH. BOARD NO. 3 LIFERAFT.

NOTE

STATION 21 TAKE PARACHUTE

BAILOUT

1 UPON RECEIPT OF PREPARATORY COMMAND (VERBAL AND 4 SHORT RINGS) PUT ON PARACHUTE

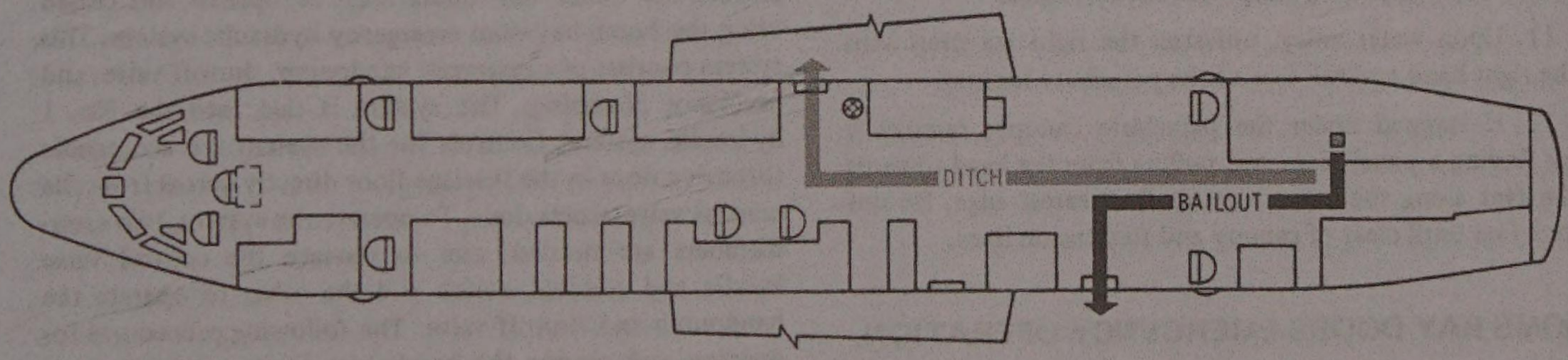
2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

AS ASSIGNED OR DIRECTED BY TACCO

STATION 23



DITCHING

POSITION: IN FORWARD OUTBOARD SEAT

1 SECURE LOOSE EQUIPMENT

2 TAKE DITCHING STATION AND ADJUST SEAT BELT

3 AFTER STOP, TAKE STARBOARD EMERGENCY WATER BREAKER AND EXIT STARBOARD OVERWING HATCH. BOARD NO. 3 LIFERAFT

CODE

DITCHING STATION AND EXIT ROUTE

BAILOUT EXIT ROUTE

⊗ LOCATION OF EQUIPMENT ASSIGNED FOR DITCHING

BAILOUT

1 UPON RECEIPT OF PREPARATORY COMMAND (VERBAL AND 4 SHORT RINGS) PUT ON PARACHUTE

2 WHEN PREPARED TO BAILOUT, ASSEMBLE IN FRONT OF MAIN CABIN DOOR

3 BAILOUT THROUGH MAIN CABIN DOOR WHEN DIRECTED

FIRE BILL

AS ASSIGNED OR DIRECTED BY TACCO

PAC-1(B12)0068

Figure 5-9. Ditching and Bailout Procedures (Sheet 9 of 9)

6. Squeeze the LPA waist lobes together and manually open Velcro casing on the collar lobes to achieve complete inflation.

WARNING

The four-line release should not be activated if a damaged parachute canopy or broken suspension lines are observed.

7. Consider actuating the four-line release system to reduce oscillation and provide an optional method of maneuvering the parachute to an optimal landing site (adjacent liferaft or to a clear landing area). Grasp the release lanyard loops located on the inside of the rear risers and break the release ties by a sharp pull (approximately 20 pounds force). This action will free the rear four suspension lines allowing the canopy to form a lobe in the rear center and permit a steady escape of air reducing the oscillation and providing minimal directional control by pulling on the respective release lanyard.

8. Raise and lock the helmet visor (if over land, leave visor down and locked) and remove gloves if desired.

9. Attempt to turn into the wind, to avoid being caught under parachute canopy after water entry.

10. To prepare for water entry, grasp the left side of the parachute harness with right hand. Unfasten the parachute chest strap and left leg strap with the left hand.

11. Upon water entry, unfasten the right leg strap with the right hand and roll free of the parachute harness.

12. If trapped under the parachute canopy, remove it by finding a panel seam and pulling from the head towards the feet along the seam towards the nearest edge. Do not kick feet until clear of canopy and suspension lines.

BOMB BAY DOORS EMERGENCY OPERATION.

WITHOUT ELECTRICAL POWER.

In the event of an electrical failure, the doors may be opened or closed by operating the control valve manually. A handle for positioning the valve is attached to the control valve and is accessible through a door in the fuselage floor adjacent to the TACCO seat. A two-position selector switch, placarded LOCAL and REMOTE, is located adjacent to the control valve handle. This switch must be in LOCAL during emergency operation to preclude repositioning of the valve in event the electrical circuit is reenergized. When closing the doors, the valve handle must be held down until the doors are closed and locked, as the valve is spring-loaded to the neutral position.

The following procedures for opening and closing the bomb bay doors, in the event of bomb bay door electrical failure, are placarded on the underside of the control valve access door:

To Open Doors.

1. Selector switch–LOCAL.
2. Control valve handle–Pull up.

Note

The indicator light located near the selector illuminates when the doors are open.

To Close Doors.

1. Selector switch–LOCAL.
2. Control valve handle–Push down. (Hold down until doors are closed as valve is spring-loaded to the neutral position.)

Return selector switch to REMOTE for normal operation.

WITHOUT HYDRAULIC POWER.

In the event of hydraulic failure with or without electrical power, the bomb bay doors may be opened and closed using the bomb bay door emergency hydraulic system. This system consists of a reservoir, handpump, shutoff valve, and necessary plumbing. The system is tied into the No. 1 hydraulic system. Controls for the system are acccessible through a door in the fuselage floor directly across from the control valve access door. To operate the system, two crewmembers are needed, one to operate the control valve handle and selector switch and the other to operate the handpump and shutoff valve. The following procedures for opening and closing the bomb bay doors with the emergency hydraulic system are placarded on the underside of the handpump and shutoff valve access door:

To Open Doors.

1. Shutoff valve–Open.
2. Selector switch–LOCAL.
3. Control valve handle–Pull up.
4. Remove pump handle from its stowed position adjacent to the pump and insert it into the pump socket.
5. Operate handpump until the bomb bay doors are open and continue pumping to hold the doors open.

To Close Doors.

1. Control valve handle–Push down and hold, while operating the handpump, until the doors are closed.

2. Control valve handle–Release (handle will return to neutral).

3. Selector switch–Return to REMOTE.

CRACKED CABIN WINDOWS.

If a cabin observer window cracks in flight, alert the flight station immediately. Try to determine if the crack is in the outer or inner pane and so advise the flight station. Stand by for possible cabin pressure differential reduction and descent to below 10,000 feet. If crack is in outer pane or if undetermined, evacuate crewmembers from immediate area.

BRAKE FIRE.

When directed by pilot, crewmembers evacuate using all available exits (normally those on side opposite fire).

All crewmembers are to stay a safe distance away from the aircraft. It is preferable to stay well behind the aircraft. If a wheel explodes due to rapid cooling, the fragments tend to fly out sideways from the wheel. (A tire may also explode from the heat of the fire.) Do not use CO_2 directly on wheel as this may cause it to shatter.

LANDING GEAR EXTENSION OR RETRACTION (LOSS OF POWER IN ELECTRICAL CONTROL CIRCUIT).

A fault in the electrical circuit between the landing gear handles and the landing gear selector valve may make it necessary to operate the gear by pulling the release handles or by operating the selector valve manually. If it is decided to operate the valve manually, the procedure is as follows:

1. Landing gear control circuit breaker–Pull (E).

2. Landing gear handle–As desired (P).

3. One power lever–below 41° coordinator, if extending without main dc bus (P).

4. Landing gear selector valve–Operate (E).

When raising the gear, this control must be held in until the gear is reported up and locked. It is accessible through the hatch over the hydraulic service center. When extending the landing gear without electrical power (main dc failure), retard one power lever to FLIGHT IDLE before operating the landing gear selector valve and verify that the WHEELS flashing red warning light functions. Extinguishment of this light will be the only indication that the gear is down and locked.

SECTION VI–ALL-WEATHER OPERATION

For information concerning all-weather operation of the aircraft,
refer to NAVAIR 01-75PAC-1.

SECTION VII
COMMUNICATIONS PROCEDURES

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COMMUNICATIONS.

The P-3 aircraft has a highly refined communications system which provides for communication in voice and teletype. It is mandatory that every crewmember understand the communications system thoroughly to effectively utilize the high degree of flexibility designed into the P-3 aircraft. To operate the communications system as an integral part of the ASW weapons in coordinated operations, the pilots, tactical coordinator, and NAV/COMM must be familiar with the current communications plans. The communications plan of operation orders outlines the reports required, to whom they are to be sent, the frequencies to be used at specific times, the determination of precedence, the use of authenticators and crypto materials, and all other phases of airborne communications necessary to properly carry out the assigned mission. Specific fleet communications instructions and techniques are contained in Wing Communication Plans and OP Orders.

NEW

Note

A detailed description of all P-3 aircraft radio and navigation electronic equipment is located in this Section and Section VIII. Figures 7-1 and 7-2 show the electronic equipment antenna locations.

MESSAGE RELEASING AUTHORITY.

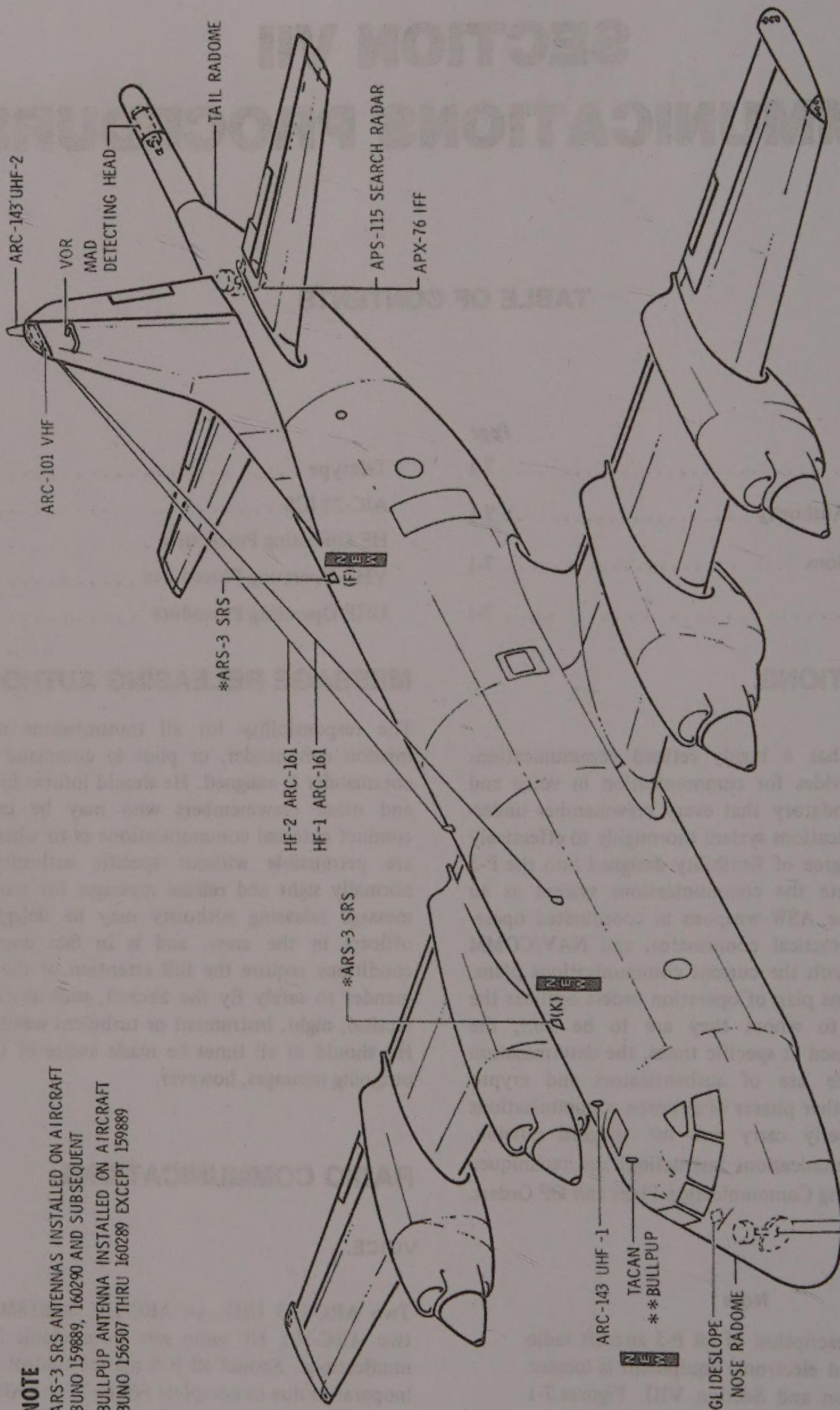
The responsibility for all transmissions rests with the mission commander, or pilot in command if no mission commander is assigned. He should inform his NAV/COMM and other crewmembers who may be called upon to conduct external communications as to what transmissions are permissible without specific authority. He should normally sight and release messages for transmission. The message releasing authority may be delegated to other officers in the crew, and is in fact encouraged when conditions require the full attention of the mission commander to safely fly the aircraft, such as during low level tactical, night, instrument or turbulent weather operations. He should at all times be made aware of the content of outgoing messages, however.

RADIO COMMUNICATIONS.

VOICE.

Two ARC-143 UHF, an ARC-101 or 618M-3A VHF, and two ARC-161 HF radio sets are available for radio communications. Should all ICS master control panels become inoperative due to complete failure of the AIC-22 intercom, the VHF can be operated by plugging in a microphone and earphones to the transmitter and receiver respectively.

ANTENNA LOCATIONS - TOPSIDE



NOTE

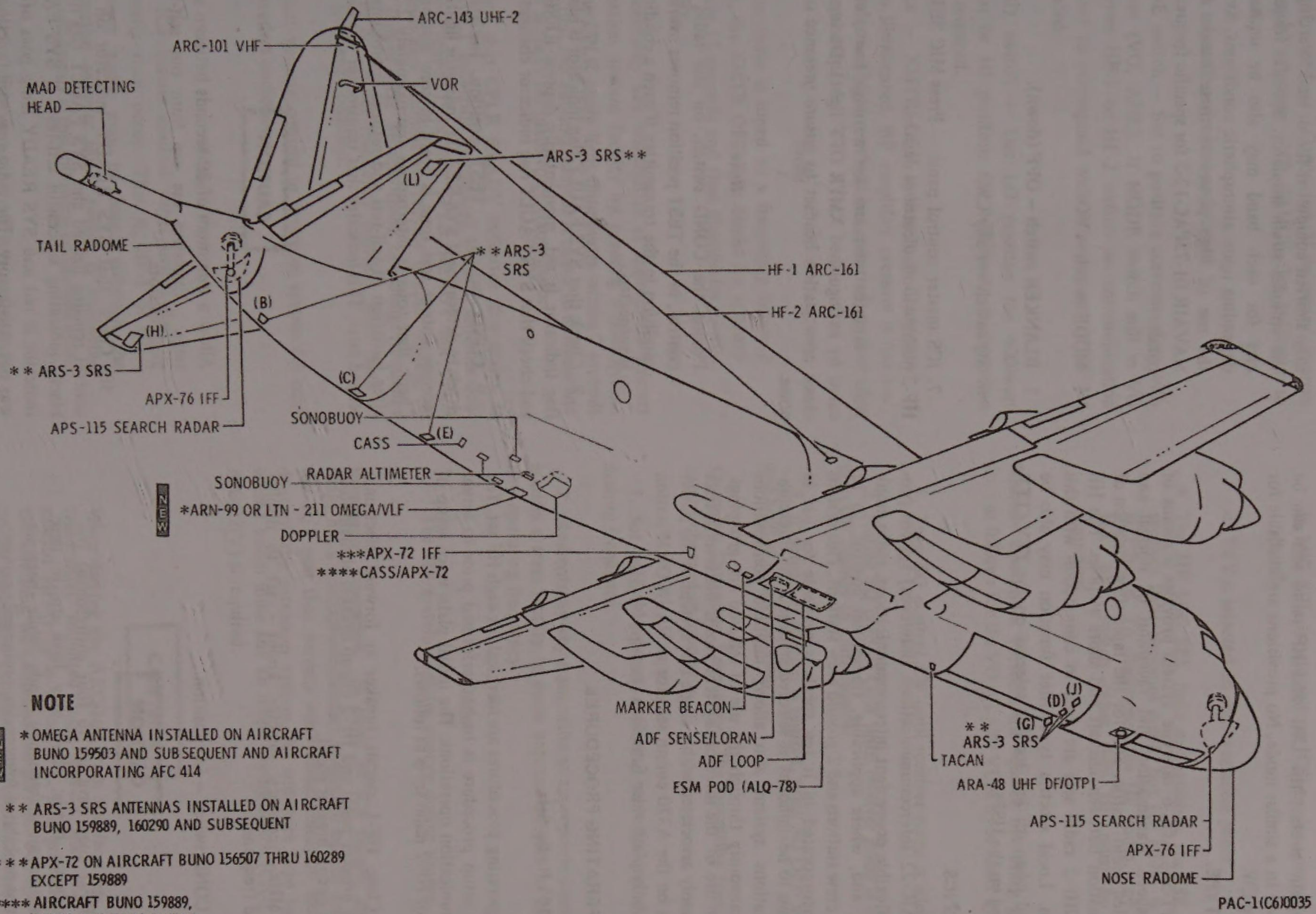
*ARS-3 SRS ANTENNAS INSTALLED ON AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT

**BULLPUP ANTENNA INSTALLED ON AIRCRAFT BUNO 156507 THRU 160289 EXCEPT 159889

NEW

Figure 7-1. Antenna Locations -- Topside

ANTENNA LOCATIONS - UNDERSIDE



NOTE

NEW * OMEGA ANTENNA INSTALLED ON AIRCRAFT BUNO 159503 AND SUBSEQUENT AND AIRCRAFT INCORPORATING AFC 414

** ARS-3 SRS ANTENNAS INSTALLED ON AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT

*** APX-72 ON AIRCRAFT BUNO 156507 THRU 160289 EXCEPT 159889

**** AIRCRAFT BUNO 159889, 160290 AND SUBSEQUENT

Figure 7-2. Antenna Locations -- Underside

On certain aircraft the UHF and HF radio sets can be operated in a similar mode. No provisions are available for sending CW.

TELETYPE.

The TT-568/AGC-6 teletype system provides a means of high speed transmission and reception of normal and classified radio traffic, and for the rapid dissemination of information between aircraft and shore stations. The HF and UHF-2 radio sets are used in conjunction with this system. Local electric typewriter function may also be utilized when off line local is selected on the TTY (TTY selected on the HSP).

AIC-22 ICS.

The AIC-22 intercommunications (intercom) system provides flexible convenient intercommunications, radio monitoring and, where applicable, transmitter control, to 12 flight crew stations and 2 ground crew stations. This system has incorporated in it ten speakers available for use in addition to headphones at selected stations. The intercommunications system also allows multiple conversations simultaneously through the use of selected line groupings. Proper use of the intercom system avoids the interference commonly associated with a single line system. If the power switch on the A370 comm selector at NAV/COMM station is off, only plain voice functions are available.

HF OPERATING PROCEDURES.

ARC-161 Radio Sets.

The operating procedures are identical for each HF set. The initial setup procedure is to be performed prior to actual communication operations. The initial plain voice setup of HF-1 or HF-2 radio set is as follows:

1. Close HF-1 circuit breaker at forward electronic circuit breaker panel and HF-2 circuit breaker at main load center circuit breaker panel.

2. MHz frequency selector knobs – set to display desired frequency.

3. COND switch – LO position.

CAUTION

HF-1 may have up to four antiresonant frequency bands; HF-2 may have up to two antiresonant frequency bands. While these are not prohibited frequencies, prolonged or unnecessary use of frequencies within these bands may shorten equipment life or lead to arcing at the antenna strain insulator. Specific frequencies for each band may also be unusable depending upon atmospheric conditions. Avoid the use of high power in these bands. See NAVAIR 01-75PAC-12-3 for specific frequency bands.

4. MODE switch – VO.

5. BLANKER switch – OFF (down).

6. SQ switch – Fully CW.

7. ICS master control panel – Press MIC SEL HF-1 or HF-2 pushbutton-indicator as desired.

Wait 5 minutes minimum for warmup (completion indicated by extinguished XMTR OFF light). During warmup, check crew station headset to ensure presence of receiver noise.

Note

Placing the COND switch, on the radio set control, in the TEST position removes overload condition in the transmitter if such a condition is suspected.

8. Check that SYS FAULT flag indicator is black. If the flag indicator is red, momentarily depress RESET switch and check that SYS FAULT flag indicator changes to black.

9. COND switch – TEST position. Initiate self-test check to determine if SYS READY indicator lights and that receiver output test tone is heard in crew station headset. Check that tone is interrupted approximately 2.5 seconds after initiation of self-test and returns approximately 0.25 second later. This indicates that transmitter was keyed.

CAUTION

Allow a minimum of 20 seconds between self-tests. Excessive use can burn out self-test load resistors.

NEW

10. Check that SYS READY indicator on radio set control remains lighted and SYS FAULT flag indicator is black, indicating successful self-test. If SYS FAULT flag indicator is red and SYS READY lamp goes off, self-test was not satisfactory. The radio may still function well, but the problem should be reported.

11. COND switch – LO position. If necessary, depress RESET switch to cause SYS FAULT flag indicator to indicate black.

Perform the transmit procedure as follows:

1. MODE switch – Set to position corresponding with intended use (VO, AME). If MODE switch still in VO position, press HF-1 or HF-2 switch on communication selector panel to correspond with intended use of HF set being operated.

2. COND switch – Use LO position for 400-watt transmission or HI position for 1000-watt transmission outputs as required.

3. Check – XMTR OFF indicator is illuminated. If indicator is illuminated, RF amplifier pressure is too low, temperature is too high, overload has occurred, or the radio has not warmed up.

Note

If the radio is tuned to a frequency below 2 MHz, the XMTR OFF light blinks for approximately 15 seconds and then illuminates continuously.

4. Momentarily key transmitter at appropriate aircraft communication system facility by pressing a microphone switch. The CPLR ready light illuminates within 7 seconds indicating that the antenna coupler is tuned to antenna and the system is ready for plain voice transmission.

5. Check that CPLR READY indicator illuminates. If CPLR FAULT indicator illuminates instead, antenna coupler is not tuned. If neither CPLR READY nor CPLR FAULT indicator illuminates, recycle coupler tuning by changing tens-of-MHz switch from operating frequency position to any other frequency position, then back to operating frequency position.

6. Adjust volume control in intercom system for comfortable headset audio level.

Note

- An ICS master control panel switch lighting anomaly may occur. That is, HF-1 or HF-2 receiver audio may be heard although the respective receiver select switch is deselected (lighted green) if the following conditions exist:

  a. HF-1 or HF-2 PLAIN VOICE is selected on comm selector panel

  b. MIC SEL is selected on ICS master control panel

  c. TTY is selected on comm selector panel

- The HF MIC SEL light extinguishes, the HF receiver light becomes green, but HF audio is still heard. To disconnect the HF audio, any MIC SEL switch other than HF must be depressed.

Squelch Operation. Perform the squelch operating procedure as follows for the VO (PLAIN VOICE) or AME modes:

1. Turn SQ control CW until receiver noise is silenced.

2. Rotate SQ control CCW until receiver noise is heard, then CW slightly to mute receiver.

3. If defeat of squelch is desired, press SQ OFF switch and hold as long as necessary.

Changing Operating Frequency. The operating frequency can be changed as follows:

1. Set MHz frequency selection switches to display desired frequency.

2. Momentarily key transmitter at appropriate communication system facility to cause antenna coupler to tune to new operating frequency.

Note

The HF system radiates energy during tuning.

NEW

Emergency Operation. In event of ICS failure, the HF radio has a microphone/headset connector on the front of the R/T unit that permits voice communication independent of the intercom system. An ordnance type headset with a boom mike and an inline keying device [CX-11754/AIC-22(V) is required.

CAUTION

When keying the ARC-161 from the receiver-transmitter mounted jack, ensure that the unused HF radio is turned off. This grounds the idle long wire antenna and prevents damage to the associated coupler, receiver-transmitter, and power amplifier.

TT-568/AGC-6 Teletype System.

1. Close TTY/TPR switch if secure unit is installed.

2. Close circuit breakers at the main load center circuit breaker panel: HF-1, HF-2 or UHF-2.

3. Ensure comm selector panel PWR switch is on.

4. Place selected HF or UHF-2 transceiver control to TTY position (comm selector panel).

5. Turn PWR switch to on. Turn light intensity switch clockwise.

6. Turn PWR SW on HSP to on.

7. Press DIR send key and select TTY on HSP. This keys the selected transmitter. Proceed to type the desired message.

8. After message is sent, press REC key. This allows receipt of incoming messages.

VHF OPERATING PROCEDURES.

618M-3A (Control Unit 313N-5) Operating Procedures*.

1. Position power control switch to PWR.

2. Turn the megahertz control unit until the first three digits of the desired operating frequency appear in the indicating window.

3. Turn the kilohertz control until the last three digits of the desired operating frequency appear in the indicating window.

4. Adjust volume control until desired audio level is obtained.

Emergency Operation. In the event of ICS failure, microphone and headset can be plugged into transceiver for communications purposes.

Note

A phone type jack plug (PJ-055B) is required for receiver operation.

ARC-101 Operating Procedures.

1. Close circuit breakers at the aft electronic circuit breaker panel.

2. VOL switch – Rotate CW from OFF position.

3. Mode selector switch – VOR.

Note

Use in the T/R position only when frequencies 116.00 to 118.0 are to be used for communication.

4. Frequency – Rotate tuning knobs until desired frequency is visible in center window.

5. SQ control –As desired (operative only in reception mode). Check operation of SQ control on control panel. Maximum squelch is obtained when the control is fully counterclockwise.

6. RECEIVERS VHF/VOR-2 pushbutton-indicator (on ICS master control panel) – Press. Pushbutton-indicator illumination changes from green to amber. Equipment is now adjusted for operation as a receiver. (Equipment operation is simplex, although the second receiver may be used for multiplex operation.) To transmit, continue with step 7.

7. MIC SEL VHF pushbutton-indicator (on ICS master control panel) – Press. Pushbutton-indicator changes from green to amber. Microphone circuit is now connected to the transmitter.

8. Press microphone push-to-talk switch to key transmitter and transmit.

Emergency Operation. In event of ICS failure, microphone can be plugged into transmitter and headset into receiver for communications purposes.

Note

A phone type jack plug (PJ-055B) is required for receiver operation.

UHF OPERATING PROCEDURE.

Note

- The UHF radios are designed to transmit continuously for 5 minutes under all service conditions, if followed by a corresponding reception time. In addition, continuous transmission of 30 minutes is possible if temperatures do not exceed +55°C (131°F).
- Warmup time is less than 1 minute under standard conditions, and less than 2 minutes under adverse conditions.
- Changeover from receive to transmit mode is accomplished in 10 milliseconds.
- Selection of SONO COMMAND automatically tunes UHF-2 transmitter to 291.4 MHz and switches it in as a backup transmitter for the ASA-76 (CASS). Keying and modulation is provided by the ASA-76 reference signal generator.

*Aircraft BUNO 161122, 161132 and subsequent

1. Close circuit breakers at center electronic circuit breaker panel.

Initial setup in plain voice:

2. Frequency – Rotate selectors to display desired frequency.

NEW 3. Mode selector – MAN.

4. Function selector – T Test. Observe illuminated GO indicator.

5. Function selector – R Test. Observe illuminated GO indicator.

Note

These self-tests perform overall receiver/transmitter checks. Fault isolation/trouble-shooting tests can be conducted from the front panel of the UHF R/T unit if either self-test fails.

6. Function selector – T/R + G. May be set to the T/R position if guard reception is not desired.

NEW NEW NEW NEW NEW NEW NEW NEW NEW

7. SQUELCH, M and G – As desired.

8. UHF-2 (on comm selector panel) or UHF-1 (on voice selector panel) PLAIN VOICE – Press. Pushbutton-indicator illuminates amber.

9. MIC SEL UHF-2 (or UHF-1) on ICS master control panel – Press. Pushbutton-indicator illuminates amber.

10. Press microphone push-to-talk switch to key transmitter. For teletype and data link operation (with UHF-2 only) perform the preceding initial steps except in step 7 select UHF-2 TTY or DATA on comm selector panel. Refer to teletype and data link operation paragraphs in Section VIII for additional procedures involving teletype and data link operation.

Set up UHF-2 (UHF-1) cipher voice:

1. Perform preceding steps 1 through 6.

NEW 2. UHF-2 (on comm selector panel) or UHF-1 (on voice selector panel) CIPHER VOICE – Press. Pushbutton-indicator illuminates amber. For UHF-2 setup only, flight station must have UHF-1 voice selector panel power ON and PLAIN VOICE pushbutton-indicator illuminated amber.

3. UHF-2 (UHF-1) CIPHER (on ICS master control panel) – Illuminated amber.

4. MIC SEL UHF-1 (UHF-2) (on ICS master control panel) – Press. Pushbutton-indicator illuminates amber.

5. Press microphone push-to-talk switch to key transmitter. Wait for tone to cease, indicating system is synchronized, before commencing transmission.

Note

During cipher voice transmissions, if an ICS master control panel loses headset audio, cycle the forward dc circuit breaker under the COMMUNICATION SECURE VOICE group on the forward electronic circuit breaker panel.

Set up UHF-2 (UHF-1) guard:

1. Perform initial steps 1 through 9.

NEW NEW 2. Mode selector – G. UHF-2 (UHF-1) PLAIN VOICE indicator selection on the comm selector (or voice selector) panel is forced and illumination changes to amber; all other UHF-2 (CIPHER VOICE on UHF-1 voice selector panel) pushbutton-indicators extinguish.

3. MIC SEL UHF-2 (UHF-1) (on ICS master control panel) – Press. Pushbutton-indicator illuminates amber.

Set up UHF-2 sonobuoy command:

1. Perform intial steps 1 and 6.

NEW 2. Mode selector – SC. This causes the UHF-2 indicators to extinguish on the comm selector panel.

Set up UHF-1 ADF:

1. Perform initial steps 1 through 6.

NEW 2. Function selector – ADF. The UHF-1 PLAIN VOICE pushbutton-indicator illuminates amber on the voice selector panel, and CIPHER VOICE pushbutton-indicator extinguishes.

On pilot HSI control panel:

3. BRG 1 switch – DF. Relative bearing to tuned-in UHF station is indicated by pointer 1 of all three HSIs.

Note

The ARA-50 UHF-DF bearing is inaccurate and oscillatory with the landing gear extended. It should be used for instrument landing approaches only when other navaids are not available, and if used, the landing gear should remain retracted until visual contact is made with the landing area.

NEW **Degraded or Unusable Channels.**

The operator should be aware that the following list represents those channels which are commonly found to be degraded or unusable for the ARC-143 UHF communication system. (Degradation and unusability are caused by distortion originating in the frequency synthesizer.) For each radio set, however, the sensitivity of one or more of the listed channels may be normal, or only slightly degraded; or the signal strength may be adequate for short range operation of an otherwise degraded or unusable channel. Therefore, the appropriate list should be used only as a guide for the particular RT unit installed.

NEW RT-932

Degraded Channels

228.00	267.55	310.00	368.60
229.35	271.00	310.55	368.65
238.90	272.35	321.60	369.60
248.45	274.50	324.35	377.45
248.60	275.50	328.05	377.90
249.50	277.10	329.40	378.00
249.60	282.80	334.45	382.85
251.20	286.65	348.00	387.00
254.00	300.10	352.50	391.00
258.00	305.80	353.55	394.50
267.00	306.10	368.55	396.55

NEW Unusable Channels

233.00	300.00	310.80	341.10
299.90	300.05	318.50	344.00
299.95	301.00	326.20	

NEW RT-932A

Degraded Channels

249.60	267.00	301.00	378.00
258.00	300.10	310.00	387.00
		326.20	391.00

Unusable Channels

233.00	299.95	300.05	369.60
299.90	300.00	344.00	

RT-932B

Note

The following limitations apply when an RT-932B is installed:

- If communication is required on 258 to 258.975 MHz, select T/R mode on the control panel.
- If guard receiver operation is required, select T/R + G on the control panel but do not select 258 to 258.975 MHz.

Degraded Channels

232.875	299.000	357.600	379.750
246.000	299.750	388.400	381.500
253.750	303.375	359.200	382.375
255.200	326.200	360.000	383.250
272.500	335.000	371.025	384.125
275.000	353.000	373.000	385.000
279.800	356.800	378.875	

Unusable Channels

232.975	279.600	318.000	347.500
233.000	302.500	326.400	352.000
264.500	304.250	330.000	371.000
265.000	305.000	346.875	372.800

Failure to pass a BITE test in one of the listed channels is not necessarily an indication of a malfunctioning radio set. The BITE test should be performed in a channel not listed as degraded or unusable.

Emergency Operation.

In the event of ICS failure, UHF radios utilizing an RT-932B have microphone/headset connectors on the fronts of the R/T units that permit voice communication independent of the intercom system. Ordnance type headsets with boom mikes and inline keying devices (CX-11754/AIC-22(V)) are required. Earlier UHF R/Ts have the capability of reception only.

SECTION VIII—MISSION SYSTEMS

PART 1—MISSION SYSTEMS (GENERAL)

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SCOPE.

This section covers the field of antisubmarine warfare systems (ASW). In general, the ASW mission is to search, localize, and kill unfriendly targets. This section is organized to physically describe and provide hardware equipment operating instructions for each operator station. Software functions available at each station are described in the applicable System Operators Manual, NAVAIR 01-75PAC-11-1 or 11-2 series.

To fully understand and grasp the functions of large systems, and interface of several collateral systems, study the foldout section of this manual and the illustrated diagrams in the Crew Station Maintenance Manuals, NAVAIR 01-75PAC-12 series. A copy of the pertinent crew station manual is part of each crew station equipment and is in the aircraft at all times.

ASW SEARCH.

The ASW search systems provide the tactical crew with the means of determining the existence of, and consequently pinpointing the location of general and specific targets. The determination-of-existence phase of the ASW search operation depends upon the operation of various sensing devices, both on board the aircraft and in the water, operating according to acoustic or electronic principles. (See figure 8-1.) This equipment is located throughout the aircraft, with operating controls located in specific operating stations, mainly sensor stations 1, 2, and 3. Overall monitoring of the search operation is from the TACCO station, and to a lesser degree, by the pilot station.

The ASW search systems include the following items, described individually in the following paragraphs. Tactical procedures are provided for each component in the appropriate part of this section.

Search Stores System
Sonobuoy Receiver System
Sonobuoy Reference System*
DIFAR System
Recorder-Reproducer System
On-Top Position Indicator System
CASS System
Ambient Sea Noise Meter System
Bathythermograph
Magnetic Anomaly Detection System
Electronic Support Measures System
Search Radar System
Infrared Detection System*
Photographic System
Digital Magnetic Tape System
Integrated Acoustic Communication System
Communications System
Navigation System
Data Processing and Display System

*Aircraft BUNO 159889, 160290 and subsequent.

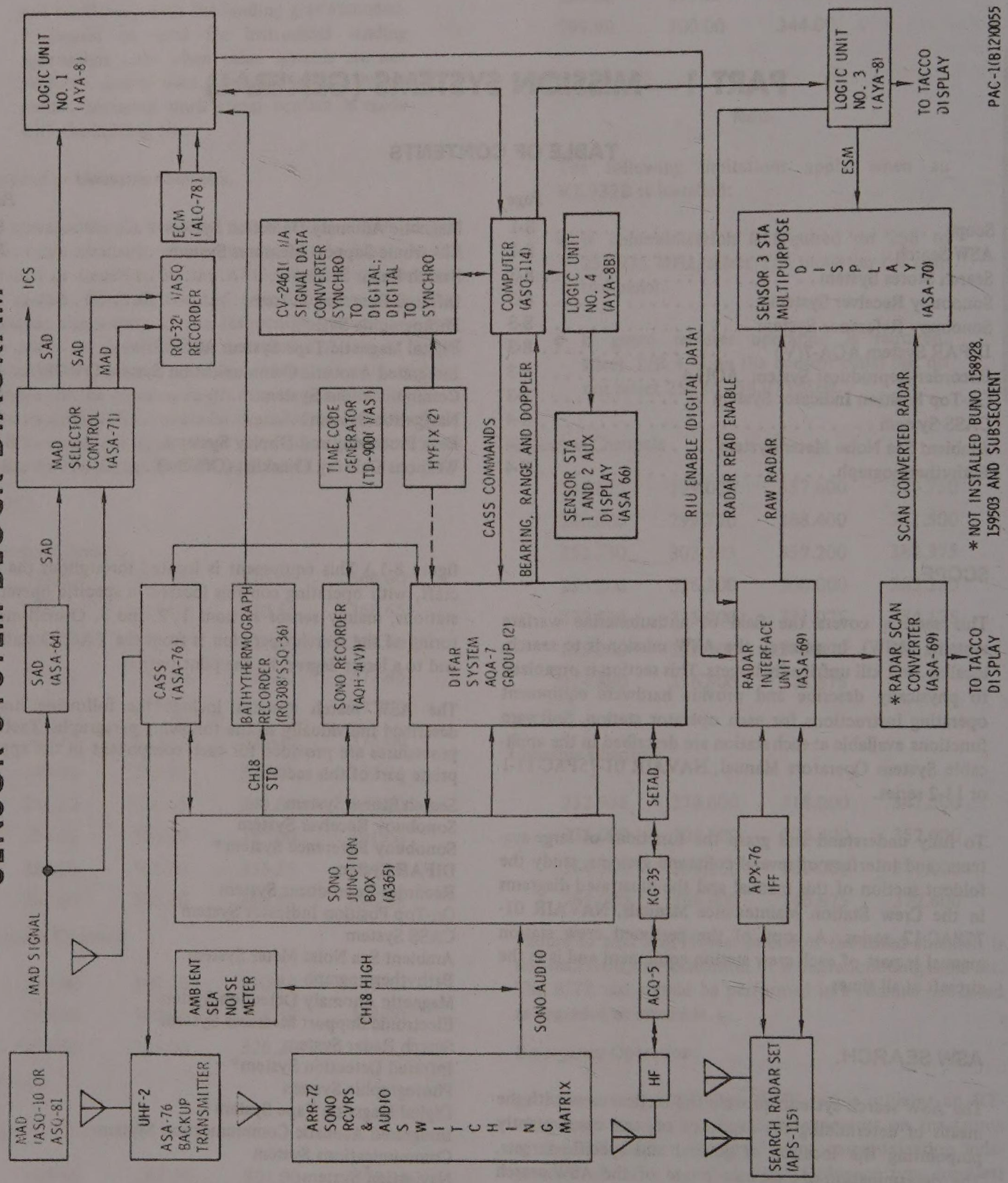

Figure 8-1. Sensor System Block Diagram

SEARCH STORES SYSTEM.

The search stores system provides the controls and circuitry for the control and release of the search stores. Normal automatic control is provided by the computer via the data processing system. Backup manual control is provided by the search stores manual control panel which allows the ordnanceman to release search stores in the manual (off-line) mode. This panel, however, is used primarily for interrogating chute loading and electrical continuity checking. The pilot exercises final control over a search store release as he must operate the search store power switch to ON before any search store can be released from the aircraft in either the automatic or manual mode.

The computer is programmed for the proper control and release of the store loaded in each launcher. Also, the computer maintains an inventory of the stores in the launchers and in the stowage bins. The inventory can be displayed on the TACCO auxiliary readout upon request from his keyset.

The sonobuoy system comprises the storage, control. and dispensing facilities for 84 A-size sonobuoys, each prepackaged in a launch container having an envelope 5.4 inches in diameter and 41.6 inches long.

Stowage for 36 sonobuoys in containers is provided in the cabin, and for 48 loaded in fixed, unpressurized launchers under the cabin floor. The fixed launchers are loaded and unloaded from outside the aircraft. Three pressurized A-size launchers are located in the cabin. An electric circuit is provided in the breech at the sonobuoy launcher for actuation of the cartridge which ejects the sonobuoy. Computer control of the sonobuoy system is addressable from the TACCO tray.

SONOBUOY RECEIVER SYSTEM.

The sonobuoy receiver system, ARR-72, consists of 31 fixed tuned receivers, receiving RF inputs from two blade-type antennas mounted on the aft lower fuselage. The individual sonobuoy receivers are selectable and processed through a digital or manually controlled switching matrix, SA-1605/ARR-72(V). There are 20 (numbered 0 to 19) switching matrices. Sixteen (numbered 0 to 15) of these switching matrices can be either computer or manually selected (by sensor station 1 or 2) to monitor any of the 31 receivers. Two of these matrices (numbered 16 and 17) are used as maintenance spares. One of these matrices (numbered 18) is used for the TACCO MON function and the BT recorder-ambient noise meter inputs. One of these matrices (numbered 19) is tuned sequentially through all 31 RF channels to monitor RF levels (light off detector). An acoustic sensor signal generator (ASSG) is included to eliminate the necessity for external test equipment during preflight.

SONOBUOY REFERENCE SYSTEM (SRS).*

The sonobuoy reference system, ARS-3, is an airborne subsystem that provides phase measurement data to the ASQ-114(V) digital computer set which determines the position of selected deployed sonobuoys in relation to the aircraft. The system interfaces with the ASQ-114(V) through the data multiplexing subunit of logic unit 4. The SRS operates passively, receiving sonobuoy transmission via ten blade antennas installed on the aircraft exterior surfaces (see figures 7-1 and 7-2).

DIFAR SYSTEM AQA-7(V).

The DIFAR system processes signals, which have been received from sonobuoys, in such a manner that they can be analyzed and classified for the purpose of locating submarines. Data is presented on chart recordings (grams), CRT displays, and aural transducers (headsets). It is also entered into the digital computer program for use by other stations, other aircraft, and for data extraction. The DIFAR system processes signals from either active or passive sonobuoys.

RECORDER-REPRODUCER SYSTEM AQH-4(V).

The sound recorder-reproducer system primarily provides sono audio recording and playback capability. The tape recorder-reproducer simultaneously records or replays 14 hard-wired channels of data relative to the operation of sensor stations 1 and 2. Eight channels are for LOFAR, four are for RO, one for the time code generator, and one is for ICS.

ON-TOP POSITION INDICATOR SYSTEM.

The R-1651 on-top position indicator (OTPI) system, comprising a VHF receiver and associated controls, operates in conjunction with the ARA-50 UHF direction finder to locate and navigate to transmitting sonobuoys. Use of the OTPI equipment does not affect the functional characteristics of the direction finder, but does change the operating frequency band from UHF to VHF, to receive the transmitting frequency band of the sonobuoys (and other broadcasting stations). OTPI sonobuoy bearings are displayed by the bearing pointers on the HSI indicators when the HSI controls are set to select DF. When the pilot selects DA and TAC NAV and copilot selects DA/DF and TAC NAV REP, undamped OTPI bearings are displayed on bearing pointer NO. 2. Damped OTPI bearings from the steering computer are displayed on the course pointers when DF is selected on the flight director system. When over a sono-

*Aircraft BUNO 159889, 160290 and subsequent.

buoy, the pointers reverse direction and pilot (or copilot) presses the mark-on-top switch on the control wheel to signal the computer of the event. There is no audio output from the OPTI receiver. Operating power is supplied from the main ac bus A, 115 Vac, phase C, and the main dc bus, 28 Vdc, through the OTPI circuit breakers on the main load center.

Note

Because of use of a common antenna, OTPI and UHF-DF equipment cannot be used simultaneously. DF use overrides OTPI.

CASS SYSTEM.

Command active sonobuoy system (CASS) is an active sonar system in which the sonobuoy pings only upon command. The command signal is transmitted to the sonobuoy by a UHF carrier and the sonar information is transmitted from sonobuoy to processing equipment on a VHF carrier via the normal sonobuoy receiver system.

AMBIENT SEA NOISE METER SYSTEM.

The ambient sea noise meter is hard wired to processor input channel (PIC) 18. To read ambient sea noise from the meter, the TACCO must use the TACCO MON function to assign the RF of a suitable buoy, such as an SSQ-57, to PIC 18.

The ambient sea noise meter uses six switch-selected narrow band filters (50, 100, 200, 440, 1000, and 1700 Hz) to provide the TACCO with a reading of the ambient sea noise at each position. The ambient sea noise data is used by the TACCO to determine the optimum spacing of sonobuoys.

BATHYTHERMOGRAPH.

The bathythermograph and ambient sea noise meter system are components of the aircraft ASW acoustic sensor system. The system interfaces with the ARR-72 sonobuoy receiver system. For the BT, RF input signals, received by the sonobuoy receiver system, are converted into ocean water temperature gradient information. This temperature information is available as a visual graphic presentation (strip chart recording) and a digital output. The visual presentation provides a permanent chart record of the temperature profile (temperature versus depth) of the ocean area being probed. The digital output is furnished to data analysis logic unit 1. The system consists of droppable sonobuoys and a chart recorder with operating controls. Operating power is supplied from the main ac bus A, 115 Vac, phase C, and the main dc bus, 28 Vdc, through the BT-REC circuit breakers on the main load center.

MAGNETIC ANOMALY DETECTION SYSTEM.

The magnetic anomaly detection (MAD) system consists of ASQ-10A* or ASQ-81(V)1** magnetic detecting set, ASA-64 submarine anomaly detecting group (SAD group), ASA-71 selector control group, and ASA-65(V)1* or ASA-65(V)2** magnetic compensator group. The MAD/SAD system is utilized at low altitude to detect submarines measuring changes (anomalies) in the normal earth magnetic field caused by the presence of the metal mass of a submarine. The submarine anomalies are processed by the system and are displayed as an inked trace on a paper tape recorder, RO-32A/ASQ. The submarine detection signal is distributed to aircraft systems as follows: (1) as a 1 kHz tone in sensor station 3 headset, (2) as symbol displayed at TACCO and SS-3 stations, (3) as recorded data in the ASQ-114(V) digital data computer, and (4) illumination of pilot and copilot SAD INHIBIT navigation advisory lights on their respective HSIs.

ELECTRONIC SUPPORT MEASURES SYSTEM.

The electronic support measures (ESM) system, ALQ-78, automatically detects and measures the parameters of intercepted radar signals in low and high band frequency spectrums. Intercepted signal parameters include true bearing of the intercepted signal. All signal data is recorded and displayed at sensor station 3 under operator control for evaluation.

SEARCH RADAR SYSTEM.

The search radar system, APS-115, is the principal airborne radar surveillance device for observing and detecting surface vessels, submarines operating with a snorkel, aircraft, and other objects of military significance. The search radar system comprises: (1) two separate, selective, long and short pulse-type radar transmitter/receivers, (2) two antennas, one in the aircraft nose and one in the tail, providing 360-degree azimuth coverage, and (3) radar and antenna control panels. Radar search scan and data pickup is performed by each radar set independently.

Video data from both radars is combined in the antenna position programmer, routed through the radar interface

*Aircraft BUNO 156507 through 156513, 156515, 156530 and 157310 through 157331.
**Aircraft BUNO 156514, 157332 and subsequent.

unit. The nose and tail antennas are tilt-stabilized by servo-mechanisms, receiving pitch and roll data from the central repeater system. Either antenna system alone will scan more than 240 degrees in azimuth, while either may be stopped to searchlight a specific area. In normal operation with both antennas the scan crossover points are 90 and 270 degrees, relative to aircraft heading. The tilt of the antenna can be controlled from 20 degrees down to 10 degrees up with reference to the horizontal. Antenna scan is selectable, being either 360 degrees or sector (45-degree scan about a selected heading).

Radar contacts and tracks may be viewed by sensor station 3 and TACCO. Sensor station 3 may also view raw radar video. The display presentation is selected on the C-7511A/APS-115, with a computer generated symbol depicting aircraft true track. Radar operating controls are located at sensor station 3.

INFRARED DETECTING SYSTEM (IRDS).*

The infrared detection set (IRDS), AAS-36, is a passive target scan device that views operator selected terrain along the aircraft path of flight and detects infrared energy. This IR radiation energy is converted to visible light and is displayed in a television-type display on a video indicator at the sensor station 3 operator and TACCO positions. The operators are then able to recognize, identify, and classify targets which would otherwise go undetected as a result of darkness, or camouflage.

IRDS RECORDING.

The scene presented on the IRDS video indicator may be recorded on a video film recorder by using the recorder control at sensor station 3. There is no on board playback. The IRDS scene is recorded on 16 mm film and must be processed on the ground after the flight.

PHOTOGRAPHIC SYSTEM.

A photographic system is provided in the aircraft for aerial surveillance, making a record of aerial reconnaissance, and for assessing the results of armament drops. The system consists of two separate and independently operated camera installations, a forward camera and an aft camera. Both cameras possess day/night capability, although only the day capability is currently used. The cameras are electrically heated internally to permit normal photography at temperatures as low as -65°F.

*Aircraft BUNO 159889, 160290 and subsequent or prior aircraft incorporating AFC 359.

DIGITAL MAGNETIC TAPE SYSTEM ASH-33.**

The digital magnetic tape system provides the computer with program load and auxiliary bulk storage memory through a controller and two digital magnetic tape units. The controller contains the interface circuits which enable writing data on the tape, reading data from the tape, testing the system, and reporting system status to the computer.

INTEGRATED ACOUSTIC COMMUNICATION SYSTEM (IACS) OV-78/A.

The IACS is a low data rate (LDR) communication system which provides RF down link and RF up link communications between IACS equipped aircraft and submerged submarines via an air transportable acoustic communications (ATAC) sonobuoy (SSQ-71). The IACS system compliments the AQA-7(V) by providing the added capability of sending security coded messages to and processing security coded messages from a submerged submarine. The IACS system interfaces with the ARC-143 UHF transceiver, ARR-72 sonobuoy receiver, and the AQA-7(V) sonar computer recorder. Figure 8-2 illustrates the relationship between the IACS and the AQA-7(V).

COMMUNICATIONS SYSTEM.

The communications system provides for the transmission, reception, and processing of a variety of intelligence and tactical data, both internally and externally to the aircraft. See figure FO-2 for a block diagram of the communications system. Because of the multiplicity of equipment, frequency channels, and using stations, communications are evaluated and provided a degree of priority control. Also, because of the numbers of channels, equipment, and operators, the availability for use of equipment becomes complex. In general, the aircraft communications system consists of an intercommunication system and five radio communication functions performed by five radio sets with their associated control panels. The functions are plain voice, cipher (coded, secure) voice, teletype, data link (to computer and data processing systems), and sonobuoy command. The radio sets are as follows:

a. A VHF radio set is used for plain voice only, controlled from the flight station.

***b. A VHF communication system provides two-way voice communications over the 116.000 to 151.975 MHz frequency range.

**Aircraft BUNO 159889, 161132 and subsequent.
***Aircraft BUNO 161122, 161132 and subsequent.

c. One UHF radio set, controlled from the flight station, is capable of plain voice transmission and reception, cipher voice transmission and reception, and automatic direction finding operation.

d. Another UHF radio set, controlled from the navigator/communicator (NAV/COMM) station, is capable of plain voice transmission and reception, cipher voice transmission and reception, covered or uncovered teletype transmission and reception, ciphered or plain data link transmission and reception, and sonobuoy command data.

e. Two HF radio sets, controlled from the NAV/COMM station, are used for voice transmission and reception, data link, and teletype functions, each plain or cipher.

The P-3C communications system comprises the following equipment (See individual equipment for aircraft applicability.):

HF-1, HF-2 Transmitter/Receiver	ARC-161
TTY Security Unit	KW-7CR
TTY System	AGC-6
Intercommunications System	AIC-22
UHF-1, UHF-2 Transmitter/Receiver	ARC-143
UHF Security Unit	KY-28
VHF Transmitter/Receiver	ARC-101
Data Terminal Set and Security Unit	ACQ-5 and KG-40
SETAD System and Security Unit	UYQ-8 and KG-35
VHF Communications	618M-3A
Integrated Acoustic Communication System (IACS)	OV-78/A

Prime control of the system is by a communications selector in the NAV/COMM station, and a UHF-1 voice selector in the flight station, plus the ICS master control panels and associated switching matrices. Function selectors have self-illuminated pushbutton-indicators for selecting the communication function. Availability of a function is indicated by green illumination of the pushbutton legend. Selection of an available function causes the pushbutton color to change to amber. This selection is also indicated, where appropriate, by pushbutton-indicators lighting on the ICS master control panels and the monitor-control panel of the data terminal set.

This lighting is interlocked with the communications equipment input power, and in the case of the ICS master control panels and DTS monitor-control panel, with the function selectors of the communication selector and the UHF-1 voice selector.

NAVIGATION SYSTEM.

The navigation system provides the following functions:

a. Long-range, point-to-point navigation.

b. Airways and terminal navigation.

c. Short-range tactical navigation.

d. Radar altimeter and low-altitude warning.

e. Reference data for tactical subsystems.

See figure FO-3 for a block diagram of the navigation system. In general, dual inertial systems are used to provide a predetermined course and position reference. Discrete, ancillary equipment provide specific position determination, course refinement, display data, and provide additional course guidance. Controls for the navigation system components are divided between the pilot station and the NAV/COMM station. The navigation system consists of the following equipment (See individual equipment for aircraft applicability.):

Doppler Radar	APN-187
Radar Navigation Set	APN-227
Flight Director System (with HSI)	AJN-15
ILS Glideslope Receiver	51V-4
Marker Beacon Receiver	ARN-32
Dual INS	ASN-84 or LTN-72
LF Automatic Direction Finder	ARN-83
Omega Navigation Set	ARN-99(V)1
Loran/Omega-VLF	ARN-81, or LTN-211
On-Top Position Indicator	R-1651
Radar Altimeter	APN-194
TACAN	ARN-52, -84(V), or -118(V)
UHF Direction Finder	ARA-50
Dual VOR Receivers	ARN-87
True Air Speed (TAS) Computer	A24G-9
VHF Navigation	VIR-31A

NMS

DOPPLER RADAR.

The doppler velocity altimeter radar set (DVARS), APN-187*, is a frequency modulated, continuous-wave radar which provides the navigator with a visual indication of groundspeed, drift angle, and altitude of the aircraft. Velocities of the aircraft in the direction of heading, and of drift, are provided to the INS systems, as well as a status signal. Status, aircraft altitude (above terrain), drift distance, and heading distance are provided to the data analysis group. Altitude information is provided also to the copilot radar height indicator. Drift angle is sent to the flight director steering computer and to the HSI. Power to the

*Aircraft BUNO 156507 through 161328.

OV-78/A IACS AND AQA-7(V) INTERFACE BLOCK DIAGRAM

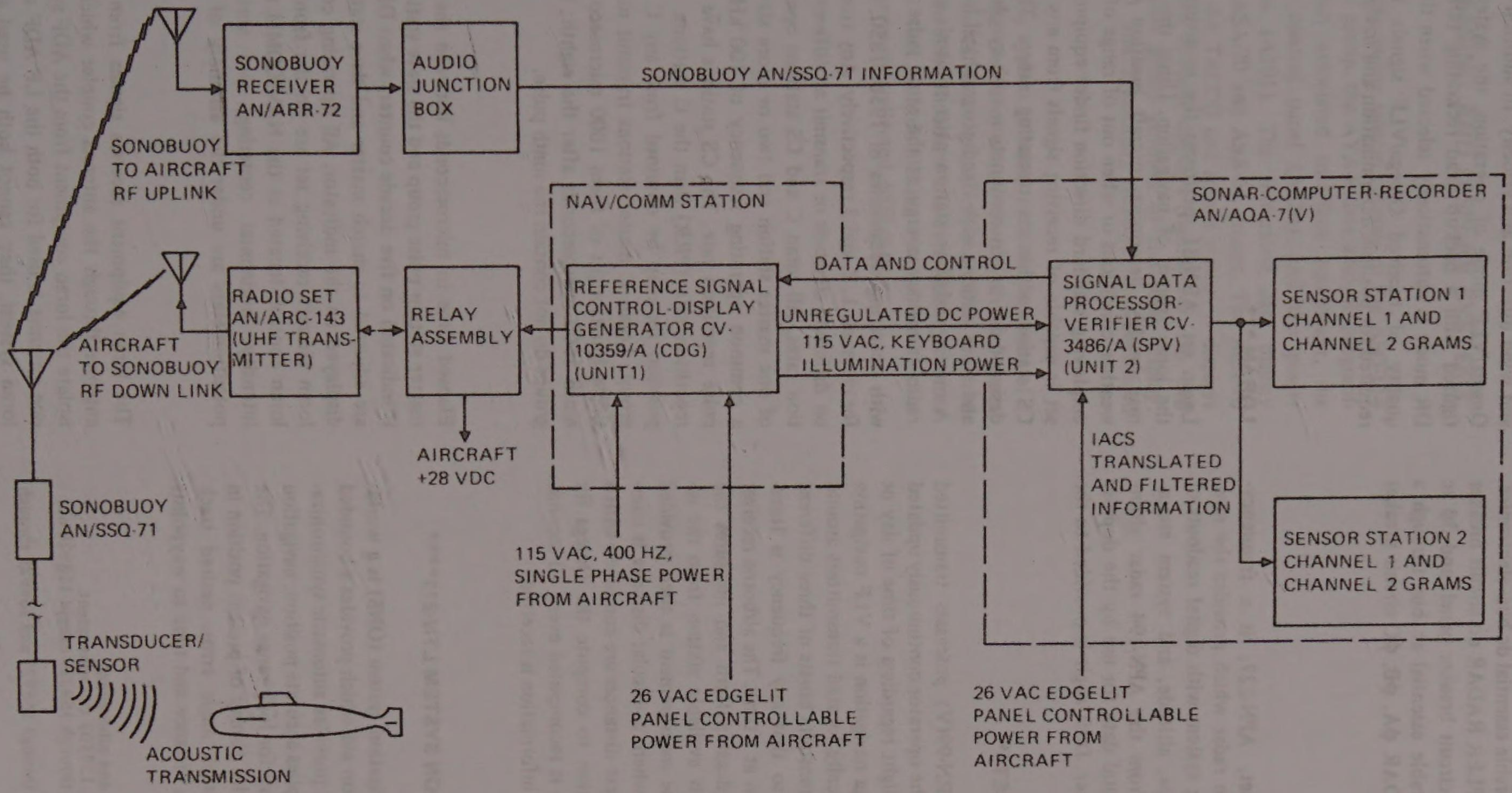

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Figure 8-2. OV-78/A IACS and AQA-7(V) Interface Block Diagram

system is from the monitorable essential dc bus–electronics, through a 5-ampere DOPPLER RADAR dc circuit breaker on the center electronic circuit breaker panel, and 3ϕ ac power from the monitorable essential ac bus through a 5-ampere DOPPLER RADAR ϕA, ϕB, ϕC circuit breaker on the same panel.

DOPPLER RADAR*

The radar navigation set, APN-227, is a frequency-modulated, switched-beam radar which provides the navigator and data processing system with digital readouts of ground speed, drift angle, altitude, and system status. Analog altitude signals from the APN-194 radar altimeter are converted to digital data for use by the doppler computer frequency tracker. Drift angle is provided to the HSI in synchro format.

OMEGA NAVIGATION SET**

Omega navigation set ARN-99(V) processes transmitted Omega signals, providing the operator continuously updated navigational data during flight regardless of time of day or climatic conditions. Omega navigation is a VLF navigation system employing strategically located transmitters around the world. Each station transmits bursts of three different frequencies multiplexed so that any frequency is transmitted by only one station at a time. The airborne receiver synchronizes to the broadcast pattern and measures the phase relationship to each available station from the receiver location. This phase measurement is then provided to the central computer where a circular distance is computed to each station. These distances are combined with a current aircraft DR position to compute the Omega fix position. This fix position is recomputed every 10 seconds as long as accurate Omega information is received.

OMEGA/VLF NAVIGATION SYSTEM LTN-211****

The LTN-211 Omega navigation system (ONS) is a world-wide, all weather, navigation aid which provides a bounded error capability. The ONS provides automatic synchronization and continuously supplies accurate position, navigation and guidance data necessary for long range navigation. The system also provides for the display of present position in latitude and longitude, track angle error, desired track angle, waypoint positions, distance and time to waypoints and wind direction and velocity. In addition to the primary Omega/VLF mode of operation, the system is also configured with a backup dead reckoning (DR) mode. The DR mode is automatically selected when the number and quality of received Omega/VLF signals is below that required for position determination and navigation.

LORAN.***

Loran set, ARN-81, performs the receiving function for the loran system of navigation. Using this, the navigator may readily determine aircraft position during adverse weather conditions or when out of range of shore stations employing standard direction finder equipment. The loran set is capable of receiving signals from any loran A, C, or CS station within its operating range. The loran set is designed for use in conjunction with synchronized master and slave stations with fixed geographical locations. Loran A master and slave station pairs transmit single pulses of radio frequency energy at the same pulse repetition rate with operating frequencies of 1950, 1850, and 1900 kHz for channels 1, 2, and 3 respectively. Any two pairs must be on different channels or transmit at different pulse repetition rates. All loran C and CS stations operate in groups of one master station and two or more slave stations, on a common operating frequency of 100 kHz at the same pulse repetition rate. The CS stations have a lower pulse repetition rate (PRR) than the C stations. A two-line-of-position fix may be obtained from any C or CS station group. Loran C master stations transmit nine pulses in a single burst, eight of them 1000 microseconds apart, the ninth 1500 microseconds after the eighth; the slave pulse groups do not contain the ninth pulse.

Elapsed time in microseconds between the arrival of the master station pulse group and the slave station pulse group is indicated on five decade counters when DELAY controls are adjusted to match master and slave stations pedestals displayed on the indicator. All operating controls for the loran aircraft receiving set are on the front panel of the loran control, located at the NAV/COMM station. Focus, intensity, horizontal centering, and vertical centering potentiometers are under the assembly of the indicator.

The loran equipment receives signals from the LF ADF antenna through the antenna coupler which functions to isolate the loran equipment from the ADF system. Because one antenna is used for both the LF ADF system and the loran system, they cannot both be used simultaneously.

*Aircraft BUNO 161329 and subsequent.
**Aircraft BUNO 158928, 159503 and subsequent.
***Aircraft BUNO 156507 through 159329 except 158928 not incorporating AFC 414.
****Aircraft BUNO 156507 through 158927 and 158929 through 159329.

DATA PROCESSING AND DISPLAY SYSTEMS.

The P-3C data processing system consists of the ASQ-114 digital computer group, the AYA-8 data analysis programming group with associated interface equipment, the TACCO power control panel (A324), and the power distribution box (A291). The integrated data display groups are the ASA-70 and ASA-66 groups. The ASA-70 group includes the TACCO and sensor station 3 displays and two auxiliary readout displays (figures 1-5, 1-6, and 1-8). The ASA-66 group consists of the pilot display, sensor station 1 and 2 auxiliary display*, and associated control panels.

The data handling system is based on the operations of a central digital data computer which receives diverse inputs, then organizes, stores, times, sequences and makes required decisions based on these functions and data. Display devices are provided in the decision-making tactical stations to monitor and observe the collected ASW data.

* Aircraft BUNO 156507 through 161328.

DIGITAL DATA COMPUTER CP-901/ASQ-114.

A miniaturized, general purpose, digital computer is installed in the aircraft at the technician station for data processing and display. The computer accepts data inputs from crew operators and various aircraft equipment (figure 8–3). It then processes these inputs to:

a. Control, synchronize and maintain symbology on tactical and auxiliary displays.

b. Provide for recording of flight data for use in in-flight recovery operations and postflight analysis of the mission.

c. Manage and control the aircraft navigation systems.

d. Manage search store and weapon inventories.

e. Control search store and weapon releases.

f. Communicate with other stations via data link and teletype.

g. Monitor and control sonobuoy receiver assignments.

h. Manage and control the electronic support measures system.

i. Manage and control the Omega navigation set*.

j. Manage and control the drum auxiliary memory system*.

k. Perform preflight and maintenance testing of associated equipment.

The computer presently utilizes three different programs to perform these functions–the operational program (OP), the systems test program (STP), and the data retrieval program (DRP). The flight technician loads the appropriate program into the computer to accomplish the desired tasks. These programs may be all contained on one tape.

Operational Program.

The computer controls data processing through execution of an operational program written specifically for the P-3C and its missions. The operational program executed by the computer is written for real-time application and consists of an executive (or controlling) routine and numerous subroutines corresponding to the various functions and capabilities of the aircraft systems. The executive routine is in control after the operational (OP) program is initialized and maintains control throughout the operational program execution. All primary functions of the operational program are under the control of the executive routine with the exception of the interrupt handling functions. The functions performed by the OP program are arranged in the tables in order of priority of execution. The function tables are searched by the executive for an active functional request and, when one is found, it is executed. Upon completion of the task, the executive again searches for an active functional request, starting again at the beginning of the function tables. All interrupts have priority over the normal program functions controlled by the executive routine and there is a priority ranking for the interrupts themselves.

(See Functional Programming Specification for the applicable OP program.) In general, when an interrupt occurs, all other interrupts of equal or lower priority are locked out and remain so until they are enabled by the program. Because normal program operation is suspended by an interrupt, the primary consideration in the design of these procedures is that they retain control from the executive routine for a minimum period of time. Interrupts are generated by either operator requests or program functions. The particular functions of the OP program available at any given station in the aircraft are described in depth in that stations associated System Operators Manual (SOM).

Systems Test Program.

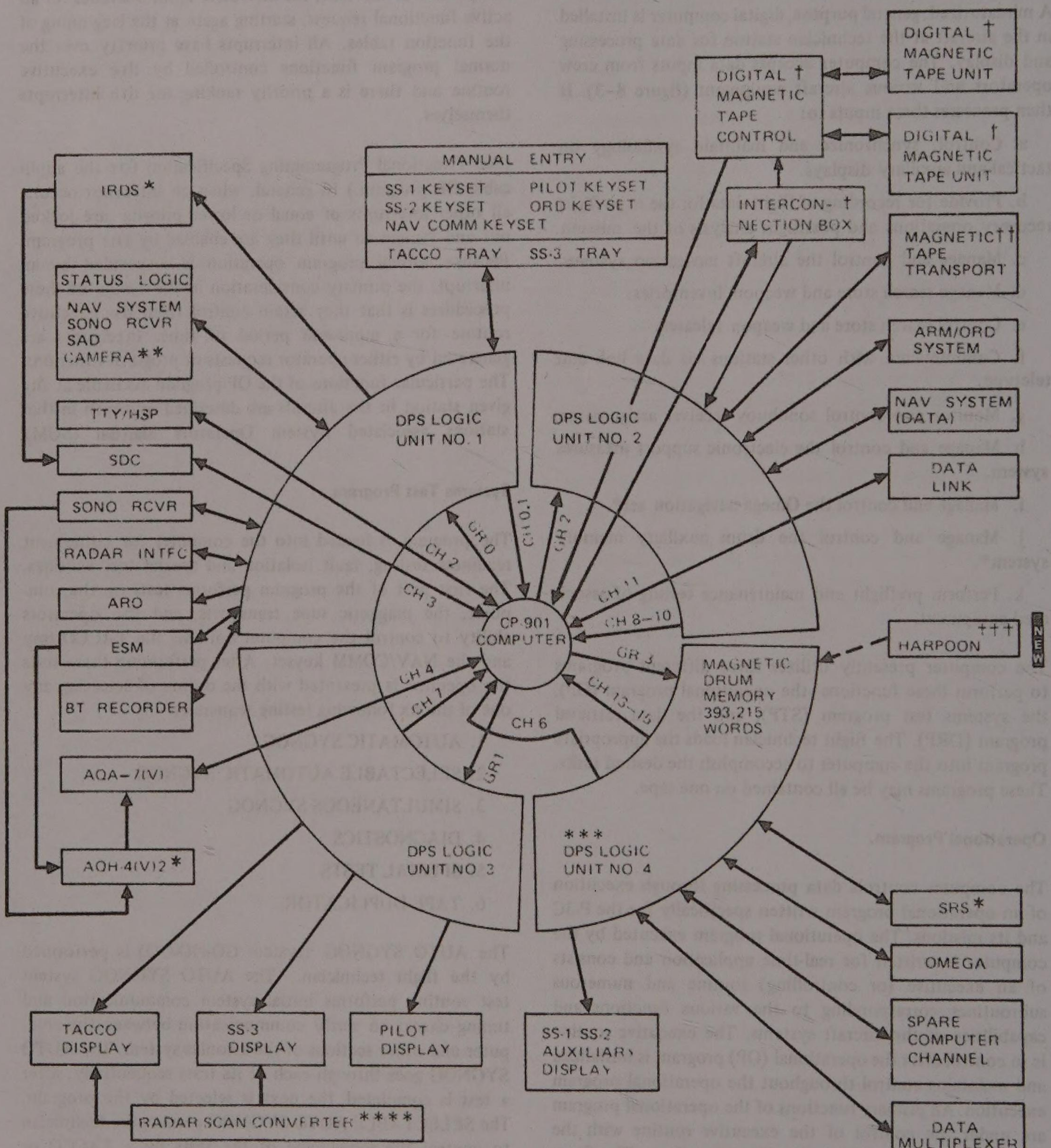
The program is loaded into the computer for equipment readiness testing, fault isolation and special test routines. The first part of the program performs tests on the computer, the magnetic tape transports, and the operators ability to control the computer both via the TACCO tray and the NAV/COMM keyset. After performing these tests the operator is presented with the option of selecting any one of the six following testing sequences:

1. AUTOMATIC SYGNOG
2. SELECTABLE AUTOMATIC SYGNOG
3. SIMULTANEOUS SYGNOG
4. DIAGNOSTICS
5. SPECIAL TESTS
6. TAPE DUPLICATOR

The AUTO SYGNOG (system GO-NO-GO) is performed by the flight technician. The AUTO SYGNOG system test routine performs initial system communication and timing checks to verify communication between the computer and other sections of the avionics system. The AUTO SYGNOG goes through each of its tests sequentially; after a test is completed, the next is selected by the program. The SELECTABLE AUTO SYGNOG permits the technician to control the sequencing of the tests by a TACCO or NAV/COMM keyset entry. The technician can select the tests one at a time in any order. The SIMULTANEOUS SYGNOG is a sequence of tests to be performed at each station in accordance with section 2 of the associated Crew Station Manual (NAVAIR 01-75PAC-12 series). If a problem

*Aircraft BUNO 158928, 159503 and subsequent.

COMPUTER DATA FLOW ASQ-114(V)



* Aircraft BUNO 159889, 160290 and subsequent
** Removed from aircraft BUNO 159889, 160290 and subsequent
*** Aircraft BUNO 158928, 159503 and subsequent
**** Aircraft BUNO 156507 through 159329 except 158928; aircraft BUNO 158928 159503 and subsequent have provisions only.
† Aircraft BUNO 159889, 161132 and subsequent
†† Aircraft BUNO 156507 through 161131 except 159889
††† Aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405

ZEM

PAC 1 (C6) 0034

Figure 8-3. Computer Set Digital Data Flow ASQ-114(V)

is detected during the SIMULTANEOUS SYGNOG the DIAGNOSTICS sequence can be initiated later to further isolate the fault. In general, the diagnostics tests are used to isolate faults in the central computer, the logic unit modules, and other interface devices. Running a diagnostic routine is an in-depth analysis of the cause of a malfunction and results in a display and HSP printout identifying the module(s) to be replaced. The routines are for alignment or special tests on certain peripheral equipments. The special tests available include an exhaustive test of the aircraft ARM/ORD system, an inertial loader/verifier test, a data link evaluation test and a radar alignment test. When either the diagnostic or special test routine is being run, no other computer activity is possible until the diagnostic or special test has been terminated.

The TAPE DUPLICATOR testing sequence is utilized by the flight technician to duplicate any of the three programs on a magnetic tape. A detailed description of the STP is the subject of NAVAIR 01-75PAC-12.7 (P-3C Crew Station Maintenance manual for the system test program).

Data Retrieval Program.

The DRP is used to systematically retrieve data from the data extract tape onto the high-speed printer (HSP) when necessary. This will normally occur when the aircraft is at a deployed site without a tactical support center (TSC). A TSC has the capability to electronically replay the mission on its displays from the same aircraft data extract tape. See the applicable system operators manual (SOM) for an in-depth description of the DRP.

DATA ANALYSIS PROGRAMMING GROUP AYA-8.

The AYA-8 group consists of three (four*) logic units, five operator keysets and trays and two (one*) magnetic tape transports (MTTs). Additional related devices are the five interface devices serving specific peripheral equipment, the TACCO power control panel and the power distribution box.

Peripheral equipment does not necessarily handle data in the same format as the computer. When a unit employs a different format or data handling technique, and is used on-line with the computer, there must be some translation of ones data into the others format. Units which provide such interpreter services are called interface devices. These devices normally have a two-fold function: to translate data format both ways between units and to provide timing for synchronizing the data transfer between the computer and peripheral device. There are eight (nine*) major interface units in the aircraft avionics package.

*Aircraft BUNO 158928, 159503 and subsequent.

Logic units 1, 2, 3, and 4*, of the AYA-8 group, each provide interface and/or routing for four computer channels. The other five major related interface units are the synchro-digital/digital-synchro (SD/DS) signal data converter, communications interface units (CIU) 1 and 2, radar interface unit (RIU), and the DIFAR interface unit (DIU). (See figure 8-4.)

Logic Unit 1.

The four computer input/output channels served by logic unit 1 (LU-1) are used by the auxiliary readout display (ARO) logic, the digital input multiplexer/digital output multiplexer (DIM/DOM), communications interface 1, and the SD/DS signal data converter (figure 8-3).

The ARO logic is the interface between the ASQ-114 and the two AROs located at the TACCO and NAV/COMM stations. (The two AROs display computer-generated digital data such as navigation information, ordnance inventories and system operating status.) The operator selects what kind of information is displayed on his ARO via a keyset entry. The ASQ-114 generates this information from memory and the ARO logic changes it into the format necessary for display on the ARO charactron tube. Test patterns for both AROs are also originated in ARO logic.

The DIM/DOM coordinates inputs and outputs between the ASQ-114 and operator keysets and trays, camera/SAD/nav status logic, sono receiver logic, radar interface unit (RIU), and BT recorder data. A sequential scan is made through the 16 channels of the DIM/DOM searching for units with data inputs and transferring computer outputs to the appropriate devices. Thus, the DIM/DOM provides multiplexing service (time sharing only) for several relatively slow devices, necessitating use of only one of the limited number of computer data transfer channels.

Communications interface unit 1 (CIU-1) is the teletype-computer interface. It is used when the ASQ-114 is sending a teletype message or when an ARO tableau is being extracted from computer memory onto the high-speed printer (HSP). In addition, the teletype keyboard (AGC-6) is used to modify the information displayed on the NAV/COMM ARO, or when the teletype is providing message traffic to the TWX REC tableau, the communications interface unit 1 again serves as the interface to the ASQ-114.

The SD/DS signal data converter codes synchro signals from synchro units into binary numbers for the computer and decodes binary numbers into synchro signals for synchro units.

LOGIC UNIT INTERFACE CHARACTERISTICS

Unit	*Input/ Output (I/O)*	*Interface For*
LU-1		
ARO Logic	O	NAV/TACCO AROs
ARO Logic	I/O	ARO IFPM
TACCO Tray Logic	I/O	TACCO Tray
SS-1 Keyset Logic	I/O	SS-1 Keyset
SS-2 Keyset Logic	I/O	SS-2 Keyset
NAV/COMM Keyset Logic	I/O	NAV/COMM Keyset
Pilot Keyset Logic	I/O	Pilot Keyset
SS-3 Tray Logic	I/O	SS-3 Tray
Nav/Camera/SAD Status Logic	I/O	Nav System/Camera System/SAD System Status
Sono Receiver Logic	I/O	Sono Receiver System
Ord Panel Logic	I/O	Ord Panel
	I	BT Recorder (relay only)
	O	Radar Interface Unit (relay only)
	O	ART-45 Function Generator (relay only)
DIM/DOM IFPM	I/O	DIM/DOM IFPM
ESM	I/O	
LU-2		
Nav Multiplexer	I/O	Doppler, INS-1 and -2
Arm/Ord Logic	I/O	Arm/Ord Systems
**Mag Tape Control	I/O	Mag Tape Transports
LU-3		
TACCO MDD Logic	O	TACCO MDD
Pilot Display Logic	O	Pilot Display
SS-3 SDD Logic	O	SS-3 SDD

Unit	*Input/ Output (I/O)*	*Interface For*
Synchro-Digital/ Digital-Synchro Converter	I	TACCO Trackball
	I	Mag Var
	I	TAS
	I	Pitch, Roll
	I	Mag Heading
	I	SS-1, SS-2 HYFIX
	I	SS-3 Trackball
	I	Nav Simulator
	O	FDS-HSI
	O	FDS-FDI
	O	TV
	I/O	SD/DS IFPM
Teletype Interface (Communications Interface No. 1)	I/O	Teletype System
DIFAR Digital Interface	I/O	SS-1, SS-2, AQA-7 DIFAR, ASA-76 CASS
Radar Interface Unit	O	Radar Scan Converter
Data Link Interface (Communications Interface No. 2)	I/O	Data Link System
**LU-4*		
Auxiliary Display Logic (ADL)	O	SS-1 and SS-2 Auxiliary Display
Data Multiplexer Submit	I/O	OMEGA/ADL/SRS/ IFPM/HACLCS
Drum Auxiliary Memory Sysetm	I/O	Drum Memory
Spare Computer Channel (SCC)	I/O	Spare Computer Channel

*Aircraft BUNO 158928, 159503 and subsequent.
**Aircraft BUNO 156507 through 161131 except 159889.

Figure 8-4. Logic Unit Interface Characteristics

The output channels from the ASQ-114 to logic unit 1 are bussed over common wires, but the inputs to the ASQ-114 come in over four separate channels. Since ARO logic and DIM/DOM are physically located within the confines of logic unit 1, both their input and output channels are through the maintenance control panel (MCP) of logic unit 1. Because of the common busing of the four computer output channels, the inputs to the SD/DS signal data converter and communications interface unit 1 are routed through the MCP of logic unit 1. However, the outputs of the SD/DS and CIU-1 are routed directly to the ASQ-114.

Logic Unit 2.

The four computer channels to logic unit 2 (LU-2) are used by the nav multiplexer, armament/ordnance system logic, magnetic tape control (MTC) logic, and communications interface unit 2. (See figure 8-3.)

The nav multiplexer serves as a time sharing and data format translating device for inertial and doppler nav inputs to the ASQ-114. It is also the interface the ASQ-114 uses to load and verify the program in the inertial nav computer during the STP inertial loader/verifier test.

The arm/ord logic enables the computer to monitor the arm/ord switch positions and status, and to control the arm/ord relays. The armament output logic (AOL) receives armament instructions from the ASQ-114 and generates relay control signals to armament system relays to release weapons. In addition, the AOL triggers the attack assessment camera following an on-line weapon release. The ordnance output logic (OOL), in the same manner, controls search store releases under the direction of the ASQ-114. The armament ordnance input logic (AOIL) monitors the position of 36 arm/ord switches, and generates arm/ord status, TACCO, pilot and copilot weapon release words, and error words to the computer.

The magnetic tape control (MTC)* logic interprets commands from the computer program, translates data format between the computer and the magnetic tape transports (MTTs) during read and write operations, controls the mechanical operation of the MTTs, monitors the status of the MTTs and informs the computer when MTT malfunctions occur.

Communications interface unit 2 provides an interface between the ASQ-114 and the ACQ-5 data terminal system in the data mode. The interface function here is both time synchronizing and data format translating.

The four computer output channels to LU-2 are bussed over common wires. Since the nav/multiplexer, arm/ord logic and MTC logic are located within LU-2 both their inputs and outputs go through the maintenance control panel of LU-2. The computer output channel to comm interface 2 is through the MCP of LU-2, but the computer input channel is direct.

Logic Unit 3.

The ASQ-114 uses three output channels to LU-3 to control display logic subunits for TACCO, pilot, and SS-3 displays. The display logic subunits decode data words from the computer to enable the mission situation to be presented on the appropriate visual display. The fourth channel served by LU-3 is used by the DIFAR interface unit (DIU) to enable communication between the computer and the AQA-7 DIFAR equipment (see figure 8-3).

Located within LU-3 is also master timing logic and function generator. Master timing logic provides timing signals for all operations within LU-3, provides sync signals to the TACCO, SS-3, and pilot displays, and provides sync signals to the radar scan converter and radar interface unit. The function generator generates conics for the TACCO display.

The four computer output channels to LU-3 are bussed over common wires. Since the display logic subunits for the TACCO, pilot, and SS-3 displays, the master timing logic, and the function generator are located within LU-3, both their inputs and outputs go through the maintenance control panel of LU-3. The computer output channel to the DIFAR interface unit (DIU) goes through the MCP of LU-3, but the computer input channel is direct from the DIU.

Logic Unit 4.**

Logic unit 4 (LU-4) interfaces four computer channels with one for drum auxiliary memory system (DAMS), one for the data multiplexer subunit (DMS), one for computer diagnostics and the remaining channel is still a spare to be used for future equipment (figure 8-3). The DAMS has a 393,216-word capacity on 384 tracks. The DMS acts as a multiplexer that interfaces one computer input/output channel into eight channels by providing data translating and time sharing services. Five channels of the DMS are interfaced by the DMS test loop, the harpoon aircraft command and launch control set (HACLCS)***, the auxiliary display logic (ADL), Omega, and the sonobuoy reference system (SRS). The remaining three channels are spares.

NEW

* Aircraft BUNO 156507 through 161131 except 159889.
** Aircraft BUNO 158928, 159503 and subsequent.
*** Aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405.

The Omega navigation set (ARN-99) operates entirely under the control of the ASQ-114 computer and has no off-line capabilities. The sensor station 1 and 2 auxiliary display logic decodes data words from the ASQ-114 computer to enable the mission situation or informational data tableaux to be displayed on the sensor station 1 and 2 auxiliary display. The drum auxiliary memory system, the data multiplexer subunit, and sensor station 1 and 2 auxiliary display logic are integral components of LU-4.

The outputs from the ASQ-114 to logic unit 4 are bussed over a common channel, but the inputs to the ASQ-114 come in over four separate channels. Since the DAMS and DMS are both located within logic unit 4, both their input and output channels are through LU-4 MCP.

Operator Keysets and Trays.

The operator keysets at pilot, NAV/COMM, sensor station 1 (SS-1), sensor station 2 (SS-2), and ordnance stations are parts of the AYA-8 data analysis programming group. The ASA-70 displays at the TACCO station and sensor station 3 (SS-3) contain the keyset in the form of a tray.

All of the keysets primarily perform the function of permitting the operator to communicate with the ASQ-114 computer. By communicating with the computer, the operator implements the on-line functions at his station; for example, controlling the stations display. Pressing a keyset or tray switch causes a coded input to be transferred to the computer via the associated keyset/tray logic. The code that a depression of the switch originates is a hardware function and is the same for any given switch independent of the particular software program loaded in the ASQ-114. However, the computer may interpret any given switch code differently, according to which software program is presently in memory, and execute the necessary instructions for performing the requested function.

Each of the keyset/tray switches is illuminated green to indicate an available function and amber to indicate an active function. The switch being dark, not illuminated, indicates the function is not available.

The keyset/tray pushbuttons are characterized as either momentary (M), alternate action (AA), inverse alternate action, matrix select (MS), or matrix readout (MRO). In general, the computer program interprets pushbutton types as follows:

- Momentary–An input from a momentary pushbutton indicator is interpreted as a request to perform a single discrete function or a sequence of discrete functions. The indicator remains green when pressed.
- Alternate Action–An input from an alternate action pushbutton-indicator is interpreted by the computer program as a request for activation of a function which is inactive or termination of a function which is active. Alternate action indicators change their background illumination to indicate an active or inactive status.
- Inverse Alternate Action–An input from an inverse alternate action pushbutton-indicator is interpreted by the program as a request for deactivation of a function which is active. Inverse alternate action indicators have their background illumination set active by the computer program to enable a function that may be deselected by the operator or aged out by the computer.
- Matrix Select–The matrix select pushbutton-indicators control the availability of the function groups identified by the legends on the matrix select pushbuttons. Only one matrix group at a time is available and is identified by the amber background illumination of the appropriate matrix select pushbutton and by the display of the MRO legends. The currently available function group remains displayed until another matrix select pushbutton is pressed. At that time the amber background illumination of the first pressed pushbutton is extinguished, that of the second is lighted, and the legends displayed on the matrix readout (MRO) pushbutton-indicators are changed to signify the change in available functions.
- Matrix Readout–The matrix readout pushbutton-indicators combine the features of either the pushbutton momentary action (M) switch or the alternate action (AA) switch with a rear projection readout (PRO). The switch is operated by pressing the illuminated pushbutton legend. Pressing a matrix readout pushbutton signals the computer program to implement the function which is associated with the message displayed on the MRO at the time of depression. A function message displayed without an amber border represents an inactive or momentary function. A function message displayed with an amber border is an active function.

Keyset capabilities available at the tactical stations vary considerably, and consequently, the TACCO, NAV/COMM, sensor stations 1 and 2, sensor station 3, ordnanceman, and pilot have unique keyset/tray switch combinations. Sensor stations 1 and 2 universal keysets are identical and are interchangeable with the NAV/COMM universal keyset except that the keyset legends are different.

Note

The specific function of each pushbutton-indicator on each keyset is fully described in NAVIAR 01-75PAC-11.1 or 11.2 series SOMs.

In general, the computer message composition can be monitored before and during transmission to the computer by visual readouts on peripheral equipment or by control pushbutton-indicator illumination on the addressing device.

The computer and the data processing system (DPS) provide for centralizing and processing most aircraft system data in and under control of the digital computer, with data transfer between computer and aircraft systems made possible by functions of the DPS. The computer performs many operations which were previously done manually and the DPS expedites transfer of data by translating it into a proper format and synchronizing its transfer.

INTEGRATED DATA DISPLAY GROUPS.

The P-3C tactical data display system consists of the ASA-70 and ASA-66 tactical data display groups. The ASA-70 group consists of the multipurpose data display (MDD) located at the TACCO station, the sensor data display (SDD) located at sensor station 3, and the two auxiliary readout displays (AROs) located at the TACCO and the NAV/COMM stations. The ASA-66 group consists of the pilot tactical data display, sensor station 1 and 2 auxiliary display* and associated control panels.

The ASQ-114 central computer generates a common ground track solution for the aircraft symbol on the MDD, SDD, pilot tactical data display and the sensor station 1 and 2 auxiliary display*. The MDD displays tactical situations, scan-converted radar plots, MAD marks, and ESM bearings to the sensor station 3 operator. The pilot tactical data display presents only the tactical situation to the pilot without any sensor data.

An auxiliary readout (ARO) display system is provided as a part of the ASA-70 tactical data display system. The system comprises two identical charactron tubes, one located at the TACCO station and one at the NAV/COMM station. The two ARO indicators display computer-generated digital data such as navigation information, ordnance inventories and system operating status. Certain portions of this digital data may be modified via TACCO tray or NAV/COMM keyset/TTY keyboard pushbutton depressions (see applicable SOM for complete data on all keyset functions).

WEAPONS DELIVERY CHECKLIST (OFF-LINE).

An off-line weapons delivery checklist for bombs, torpedoes, rockets, PMBRs, and harpoon missiles is contained in figure 8-5.

*Aircraft BUNO 158928, 159503 and subsequent.

WEAPONS DELIVERY CHECKLIST (OFF-LINE)

GP BOMBS/MINES/DESTRUCTORS (WING/BOMB BAY).

1. CIRCUIT BREAKERS . . . . . IN (O)
2. WING STATION SELECT . . . . AS REQUIRED (TC)
3. BOMB BAY STATION SELECT . . . . . AS REQUIRED (TC)
4. RELEASE MODE SWITCH . . . . . RACK REL (TC)
5. ARMING SWITCH . . . . . AS REQUIRED (TC)
6. BOMB BAY DOOR SWITCH . . . . . AS REQUIRED (P)
7. MASTER ARM SWITCH . . . . . ON (P)
8. KILL READY LIGHT . . . . . ILLUMINATED (P, TC)
9. RELEASE BUTTON . . . . . PRESSED (P, CP, TC)

TORPEDOES.

1. CIRCUIT BREAKERS . . . . . IN (O)
2. BOMB BAY STATION SELECT . . . . . AS REQUIRED (TC)
3. RELEASE MODE SWITCH . . . . . RACK REL (TC)
4. ARMING SWITCH . . . . . NOSE/TAIL (TC)
5. TORPEDO PROGRAMMING . . . . . SET (TC)
6. BOMB BAY DOOR SWITCH . . . . . OPEN (P)
7. MASTER ARM SWITCH . . . . . ON (P)
8. KILL READY LIGHT . . . . . ILLUMINATED (P, TC)
9. RELEASE BUTTON . . . . . PRESSED (P, CP, TC)

ROCKET LAUNCHERS, SUU-44A, SUU-53/A DISPENSER.

1. CIRCUIT BREAKERS . . . . . IN (O)
2. WING STATION SELECT . . . . AS REQUIRED (TC)
3. RELEASE MODE SWITCH . . . . AS REQUIRED (TC)
4. ARMING SWITCH . . . . . RKT/FLARE (TC)
5. MASTER ARM . . . . . ON (P)
6. KILL READY LIGHT . . . . . ILLUMINATED (P, TC)
7. RELEASE BUTTON . . . . . PRESSED (P, CP, TC)

PMBR.

1. CIRCUIT BREAKERS . . . . . IN (O)
2. WING STATION SELECT . . . . AS REQUIRED (TC)
3. RELEASE MODE SWITCH . . . . . FLARE (TC)
4. ARMING SWITCH . . . . . SAFE (TC)
5. MASTER ARM . . . . . ON (P)
6. RELEASE BUTTON . . . . . PRESSED (P, CP)

ELECTRICAL JETTISON.

1. (If nuclear weapons aboard) JETTISON SECTION of B-57 CHECKLIST . . . . . COMPLETE (P)
2. JETTISON SWITCH . . . . . ACTUATED (P)

HARPOON.

1. CIRCUIT BREAKERS . . . . . IN (O)
2. POWER (MCP) . . . . . ON (TC)
3. MAN MODE (MCP) . . . . . PRESSED (TC)
4. SELECT DESIRED SEARCH PATTERN (MCP) . . . . . PRESSED (TC)
5. SELECT DESIRED LAUNCH STATION(S) (MCP) . . . . . PRESSED (TC)
6. MASTER ARM SWITCH (ACP) . . . . . ON (P)
7. ENTER RANGE NM, REL BRG, TAS, AND ACFT ALT (MCP) . . . . . SET (TC)
8. DATA ENTER (MCP) . . . . . PRESSED (TC)
9. KILL READY LIGHT . . . . . ILLUMINATED (P, TC)
10. RELEASE (CONTROL WHEEL/ MCP) . . . . . PRESSED (P, CP, TC)

CAUTION

Release mode switch, placed in the RACK REL position during firing of rocket launchers, SUU-44/A, SUU-53/A, and PMBR will result in release of the rocket launcher/PMBR from the selected wing station.

NEW NEW NEW NEW NEW

Figure 8-5. P-3C Weapons Delivery Checklist (Off-Line)

PART 2—TACCO SYSTEMS

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INTRODUCTION.

TACCO station equipment includes multipurpose and auxiliary readout displays, a keyset and tray of switches, a power control panel, torpedo selection and arming panels, and the special weapons bomb rack controls. (figure 8-6)

The multipurpose display presents the current tactical situation indicating contacts, buoys, and other selected data and the aircrafts track in relation to them. The auxiliary readout (ARO) displays selectable sections of computer memory. The keyset and tray switches enable displayed ARO tableaus to be modified, provide the means for selecting computer functions to be performed, and provide for response to computer cues.

The TACCO power control panel provides the TACCO with power control of the computer, data processing, and display systems and mode control of the computer. It also indicates computer operating mode and warns of overheating conditions in the computer and logic units.

The torpedo select and arming panels provide manual control of torpedo drops in place of computer control. The bomb rack unlock controls enable special weapons drops to be made using the two-man concept.

EQUIPMENT.

The following equipment is used by the TACCO while performing his mission:

TACCO manual weapon control panel PEU-74/A (A334).

Bomb bay rack lock control panel PEU-73/A (A257).

Secondary rack lock panel.

Torpedo presetter control panel PEU-70/A (A255).

Multipurpose data display (MDD) IP-917/ASA-70.

TACCO auxiliary readout (ARO) IP-919/ASA-70.

TACCO power control panel (A324).

Aisle light control (A252).

TACCO ICS master control panel (AIC-22V).

Light control panel (A321).

Display test/control panel.

*Harpoon missile system.

**CD-159/A tactical system display group.

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* Aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405.

** Aircraft BUNO 159889, 160290 and subsequent or prior aircraft incorporating AFC 359.

NEW

TACCO STATION ARRANGEMENT (TYPICAL)

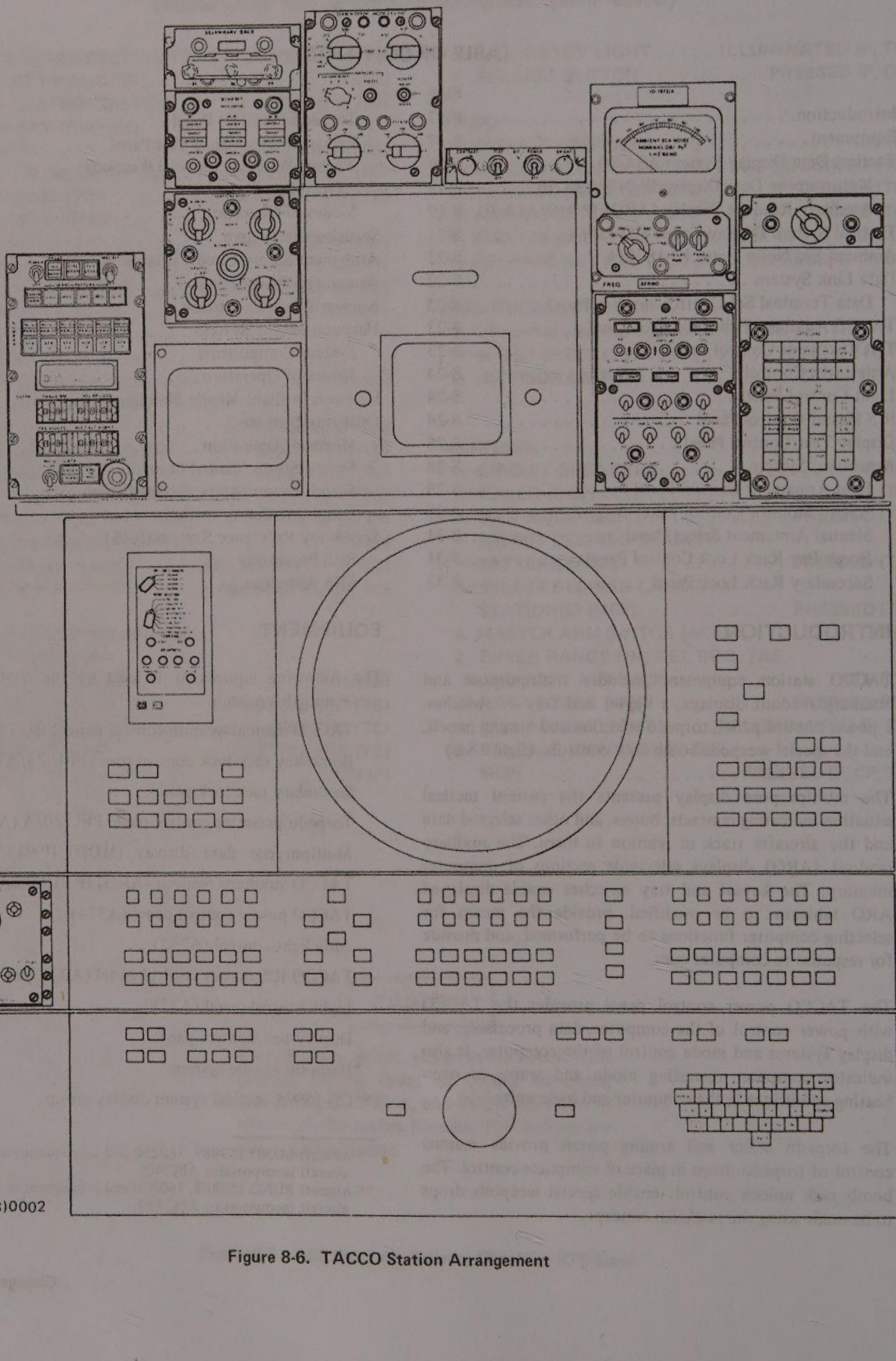

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Figure 8-6. TACCO Station Arrangement

TACTICAL DATA DISPLAY SYSTEM ASA-70.

The tactical data display system ASA-70 comprises a multipurpose data display, a sensor data display, two auxiliary readout displays, and four power supplies. The displayed data is used by the station operators to plot tactical situations, interpret sensor inputs, present radar plots, and generally to monitor mission progress. SDD functions are described in Section VIII, Part 5.

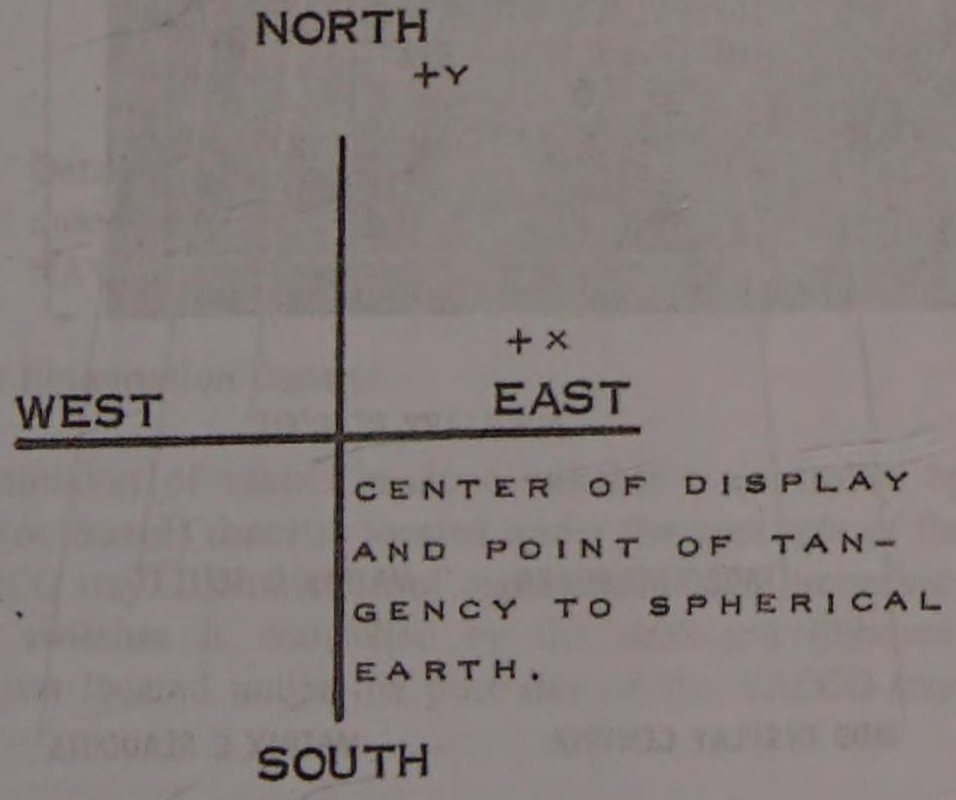
CAUTION

Do not write on the ASA-70 scope with any foreign object. The scopes porous face covering may be damaged.

MULTIPURPOSE DATA DISPLAY IP-917/ASA-70. (Figure 8-7)

The multipurpose data display (MDD) displays tactical digital data consisting of characters (alphanumerics), symbols, and conics. Displays are presented on a round charactron display. Presentation of tactical data is restricted to the largest inscribed square of the charactron 16-inch diameter. The peripheral areas are reserved for cues and alerts. Details of cues, alerts and other display symbology are discussed in the NAVAIR 01-75PAC-11-1 or 11-2 series SOMs.

The basic reference system used in the tactical displays is a flat-earth, X-Y coordinate system as shown below. The center of the display represents the point of tangency for the flat X-Y plane. The positive Y-axis is oriented vertically toward true north and the positive X-axis is oriented horizontally toward the east.



1. All data positions expressed in the X-Y coordinate system are measured in nautical miles.

2. The display range scales are 2, 4, 8, 16, 32, 64, 128, 256, 512, and 1024 nautical miles, measured from the center of the display to the edge of the charactron display tube.

AUXILIARY READOUT DISPLAY (ARO) IP-919/ASA-70.

An auxiliary readout display (ARO) system is provided as a part of the ASA-70 tactical data display system. The system comprises two identical charactron tubes, one located at the TACCO station and one at the NAV/COMM station. The two ARO indicators display computer-generated digital data such as navigation information, ordnance inventories, and system operating status. Certain portions of this digital data may be modified via TACCO tray or NAV/COMM keyset/TTY keyboard pushbutton depression (see NAVAIR 01-75PAC-11-1 or 11-2 series SOMs for specific data). Power is applied to the system through an on-off switch on the TACCO power control panel.

ASA-70 Tray.

The TACCO tray (figure 8-7) contains 36 matrix select switches, 36 matrix readout switches (MROs), 69 mono-function switches, 44 keyboard switches and a trackball. The tray switches enable the TACCO to select MDD displays, insert tactical data on the display and into the computer program, select navigation modes of operation, select navigation correction options, launch search and kill stores, modify ARO displays, initialize equipments, test equipment, control the HSP, control the MTT, and control the data link system. The specific details of TACCO tray switch selections and computer program response are described in the NAVAIR 01-75PAC-11-1 or 11-2 series SOMs. A general description relative to the operational program of tray switches follows:

a. Matrix select switches direct the computer program to activate the matrix selected, display the correct legends on the matrix switches, and light the matrix select switch amber. Pressing the switch while the switch is amber (active) is ignored by the program. An amber matrix select switch is deactivated by the activation of another matrix select switch within the same matrix (A, B or C).

Matrix select (MS) switches have a single legend which is lighted either green or amber. The program lights the legend green to indicate the matrix selection is available, and lights the legend amber to indicate the matrix selection is active. The matrix select switches are arranged in three groups of 12, designated matrix A, matrix B, and matrix C select switches. Only one matrix select switch of each group is active at a time.

TACTICAL COORDINATOR MULTIPURPOSE DISPLAY AND TRAY IP-917/ASA-70

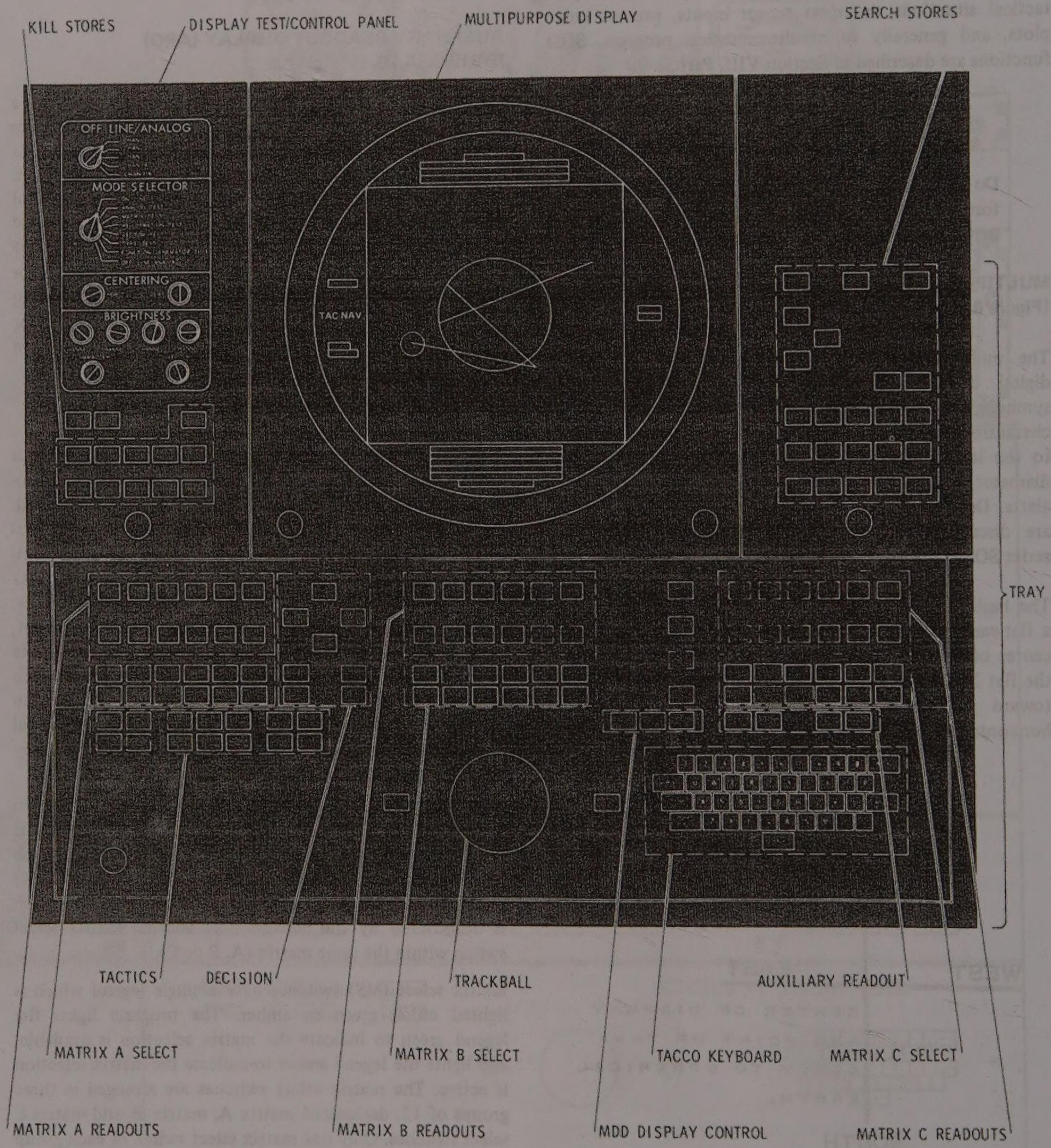


Figure 8-7. Tactical Coordinator Multipurpose Display and Tray IP-917/ASA-70

b. Matrix readout switches (MROs) display matrix selections, provide program inputs, and indicate available or active functions.

Matrix readout switches have one or two of 12 possible legends projected on the switch face by one or two of 12 different lamps. The matrix select switches determine which lamp is lighted via the computer program. The matrix readout switch legends are lighted with an amber border by the computer program to indicate available/ illuminated with active functions respectively.

c. The TACCO has 69 monofunction (MF) switches used in conjunction with the operational program. Each of these functions has a connection with the operational program which is described in the NAVAIR 01-75PAC-11-1 or 11-2 series SOMs. The functions are grouped by their relationship to each other or by their physical proximity to each other.

1. Search stores monofunction group for selection and release of all search stores.

2. Kill stores monofunction group for selection, arming, and release of kill stores.

3. Tactics monofunction group for controlling types of tactical information displayed.

4. Decision monofunction group allows TACCO to respond to computer generated cues.

5. Auxiliary readout monofunction group used to allow TACCO to select/or modify ARO tableaus.

6. Multipurpose display monofunction group allows TACCO to increase or decrease scale of MDD.

Note

Detailed instructions pertaining to TACCO monofunction switches are contained in the NAVAIR 01-75PAC-11-1 or 11-2 series SOMs.

Tray Illumination Control.

Illumination of matrix readout switches is controlled by the (outboard) rheostat located under the port side of the TACCO tray. Illumination of matrix select and monofunction switches is controlled by the starboard (inboard) rheostat located under the port side of the TACCO tray.

Trackball.

The trackball positions the hook symbol on the display and provides its position to the computer. In the TV mode, the trackball is used to position the TV camera.

CAUTION

The trackball should not be rotated about the vertical axis. To do so would score the ball.

ASA-70 Keyboard.

The TACCO keyboard is made up of alphanumeric character keys and construct/edit function keys and is the TACCOs normal channel of communications with the computer program. The TACCO may use the keyboard to enter data into modifiable selections of the ARO tableaus, to provide amplifying information which is displayed adjacent to symbols on his MDD, or to enter functional data into the computer in response to visual cues from the program. Prior to entering data into the computer, the TACCO can verify his entries through the keyboard verification area on the multipurpose display.

Note

Detailed instruction pertaining to the TACCO keyboard are contained in the NAVAIR 01-75 PAC-11-1 or 11-2 series SOMs.

*TACTICAL SYSTEM DISPLAY GROUP OC-159/A.

The OD-159/A tactical display group consists of the C-10687/A tactical display control unit (figure 8-8) and the IP-1359/A tactical display control panel (figure 8-9). The tactical display unit located at the TACCO station interfaces with the AAS-36 system to display IRDS target images. There are no controls associated with the display unit. However, a test pattern consisting of four shades of gray is generated when the tactical display control is placed in the TEST position. This test pattern allows the operator to check system operation. The tactical display control contains the necessary controls for operation and self-test of the system.

*Aircraft BUNO 159889, and 160290 and subseuqent or prior aircraft incorporating AFC 359.

IP-1359/A TACTICAL DISPLAY UNIT

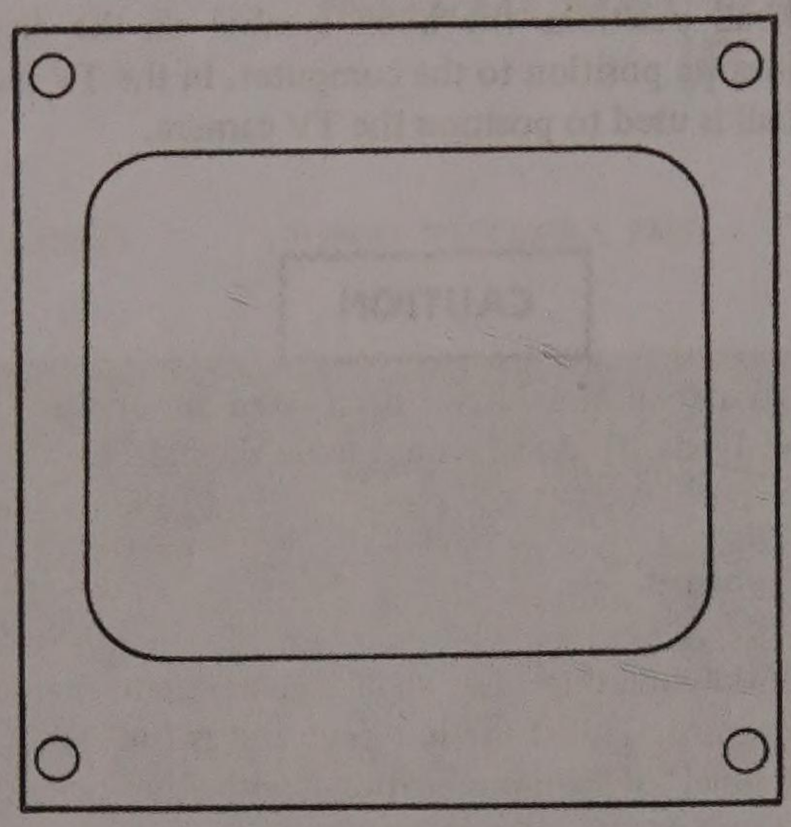


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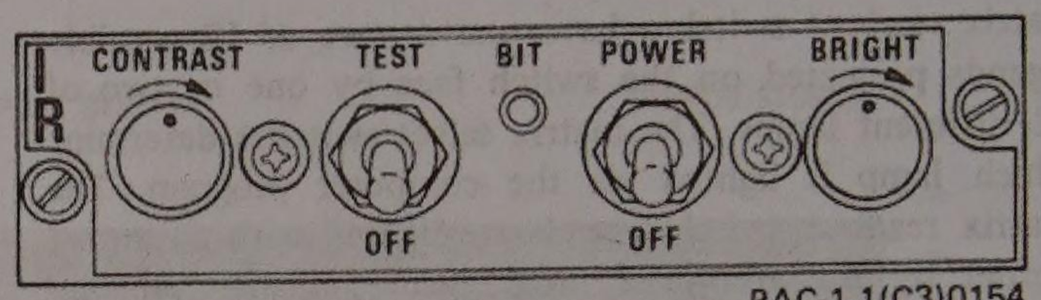
Figure 8-8. Tactical Display Unit IP-1359/A

C-10687/A TACTICAL DISPLAY CONTROL



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PANEL MARKING	EQUIPMENT FUNCTION
CONTRAST	Controls the contrast of the display
TEST-OFF	Provides self-test BIT video to the display unit in TEST position. In the OFF position, the composite video is routed to the display unit
BIT	Indicates the BIT is functioning normally when the indicator is illuminated
POWER-OFF	Supplies power to the display unit in POWER position, and disconnects power in OFF
BRIGHT	Controls the brightness of the display

Figure 8-9. Tactical Display Control C-10687/A

AMBIENT SEA NOISE METER ID-1872/A.

The ambient sea noise meter (figure 8-10) is hard wired to processor input channel (PIC) 18. To read ambient sea noise from the meter, the TACCO must use the TACCO monitor function (TACCO MON) to assign the RF of a suitable buoy, such as SSQ-57, to PIC 18.

The ambient sea noise meter uses six switch-selected, narrow band filters, 50, 100, 200, 440, 1000, and 1700 Hz, to provide the TACCO with a reading of the ambient sea noise at each position.

The data is plotted by the TACCO and used to determine the optimum spacing of sonobuoys.

Two toggle on-off switch/circuit breakers are mounted on the instrument front panel. One controls the application of 115 Vac main power. The other controls application of 5 to 28 Vac lighting power. Main power is further protected by the ambient sea noise meter circuit breaker on the forward electronic circuit breaker panel. The lighting power is further protected and regulated by the general lighting control (A321) unit.

DATA LINK SYSTEM.

The data link system is a communications link which provides computer to computer exchange of tactical data between aircraft and other participating units. Tactical data is accumulated by the operational program and selected data is encoded in Link 11 format. It is then transmitted to the other participating units which make up the data net. Data received from other participating units in the data net are decoded and converted to a format acceptable to the computer program. The data link system includes provisions for aircraft retiring from on-station duty to exchange information with relief aircraft.

AMBIENT SEA NOISE METER ID-1872/A

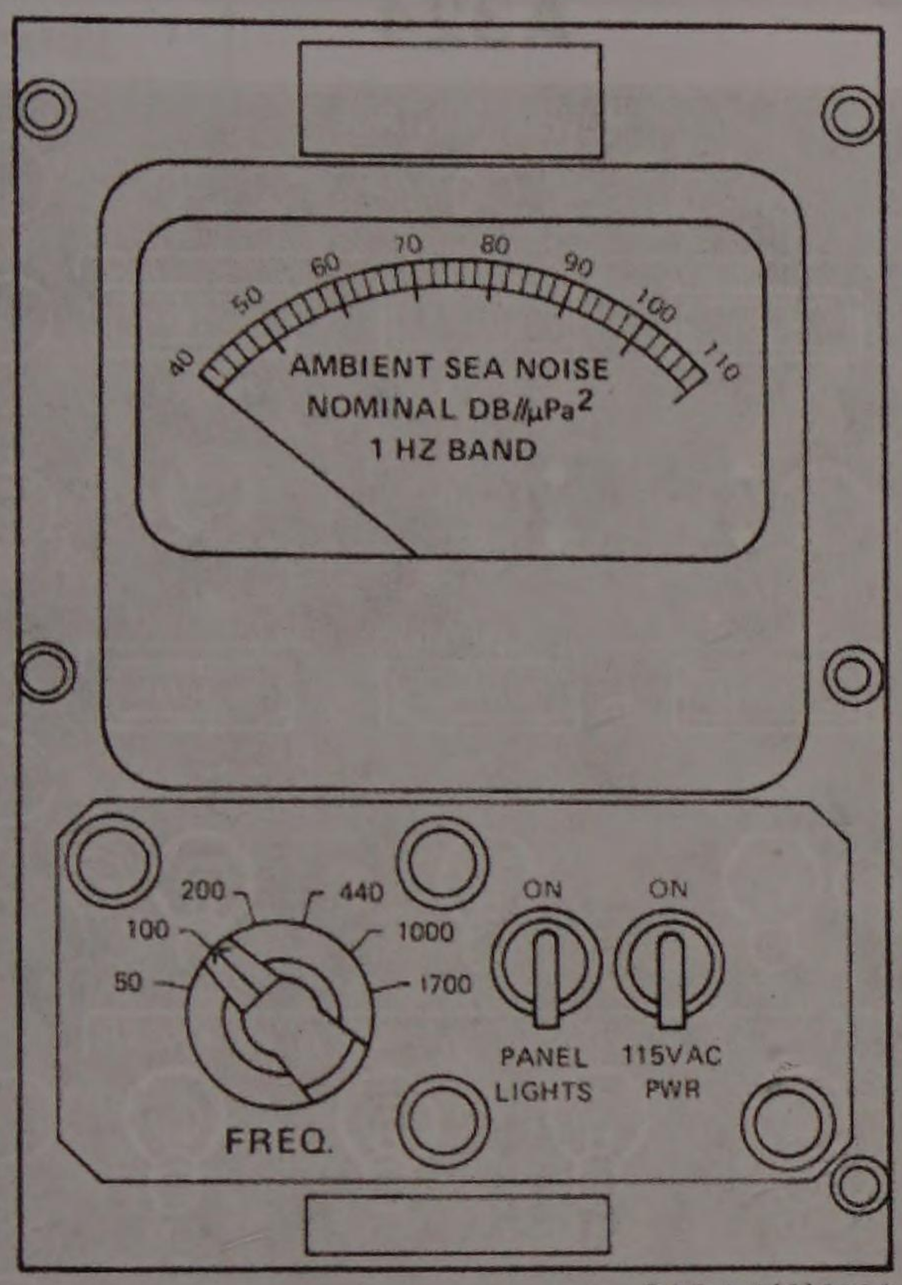

Figure 8-10. Ambient Sea Noise Meter ID-1872/A

The TACCO selects local contacts and tracks for transmission to other participating units of the data link net. Certain items are transmitted automatically if the link is established. The program displays and identifies these items on the TACCO MDD by displaying the appropriate symbol. Refer to NAVAIR 01-75PAC-11-1 or 11-2 series SOMs.

DATA TERMINAL SET CONTROL-MONITOR PANEL.

The data terminal set (DTS), ACQ-5, control-monitor panel (figure 8-11) is located in the NAV/COMM station on the upper instrument panel. This panel provides all the controls and indicators necessary to operate the data link feature of the communications system. The DTS set is discussed in Section VIII Part 3.

*TACCO AUXILIARY POWER CONTROL PANEL.

The TACCO auxiliary power control panel (figure 8-12) is located at the TACCO station on the upper center portion of the instrument panel.

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*Aircraft BUNO 158928, 159503 and subsequent.

DATA TERMINAL SET CONTROL-MONITOR PANEL C-7790/ACQ-5

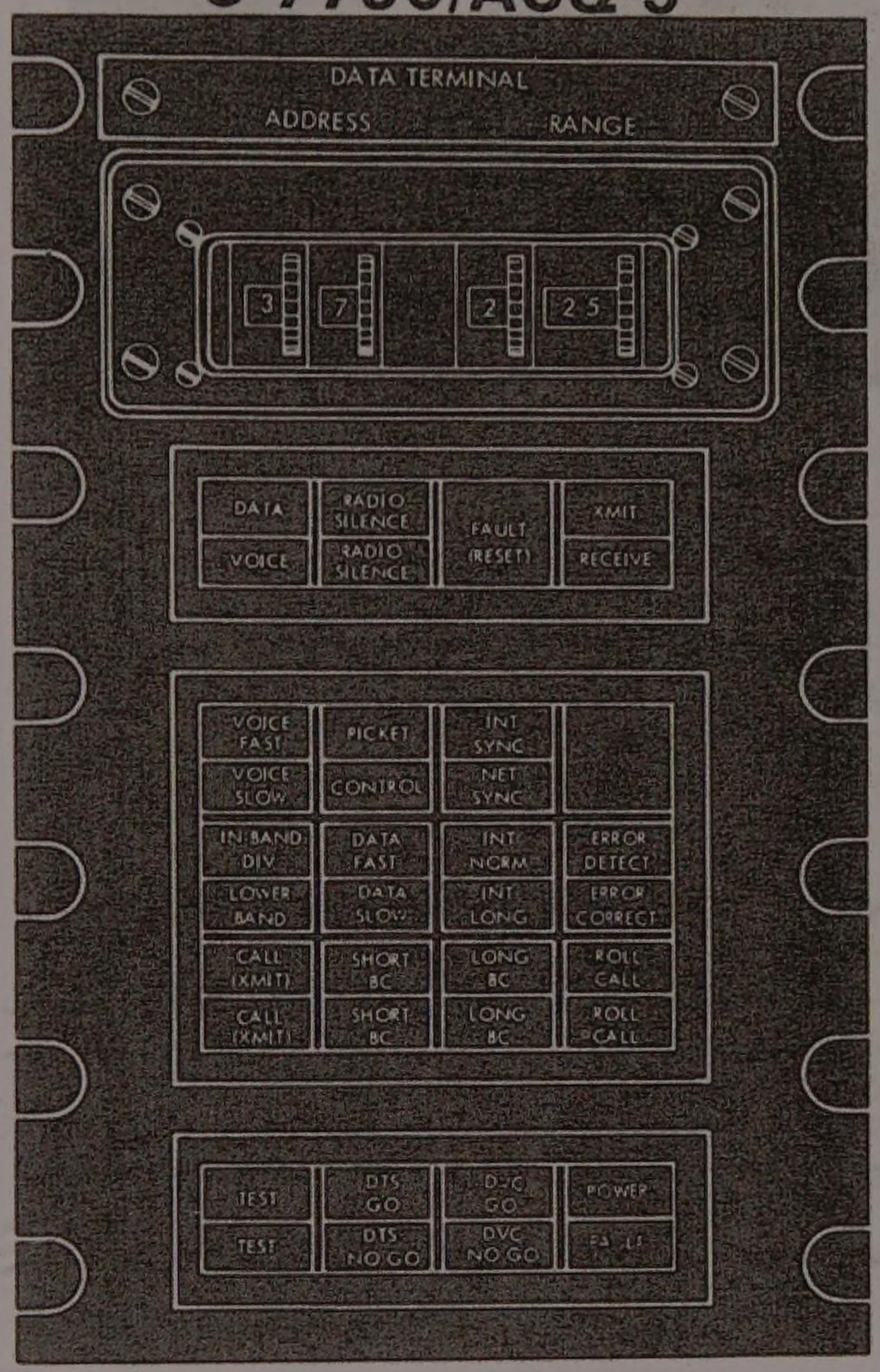


Figure 8-11. Data Terminal Set Control-Monitor Panel C-7790/ACQ-5

TACCO POWER CONTROL PANEL.

The TACCO power control panel (A324) (figure 8-13), labeled POWER CONTROL, provides centralized control of power sources for the majority of tactical data and display avionics in the aircraft. The panel is located at the TACCO station on the upper right portion of the instrument panel.

TACCO AUXILIARY POWER CONTROL PANEL

PAC-1.1(C)0026

PANEL MARKING	EQUIPMENT FUNCTION
LOGIC UNIT	
OV TEMP	Indicator lights if overtemp condition exists in logic unit 4
UNIT 4/ OFF	Operating power supplied/removed to logic unit 4
SS1 & SS2 DISPLAY/ OFF	Operating power supplied/removed to SS-1 and SS-2 auxiliary display

Figure 8-12. TACCO Auxiliary Power Control Panel

AISLE LIGHT CONTROL.

The aisle light control panel (figure 8-14) is placarded OFF, LOW and HIGH and is used to turn on and control cabin lighting intensity from the TACCO station location to the sensor stations 1 and 2 area.

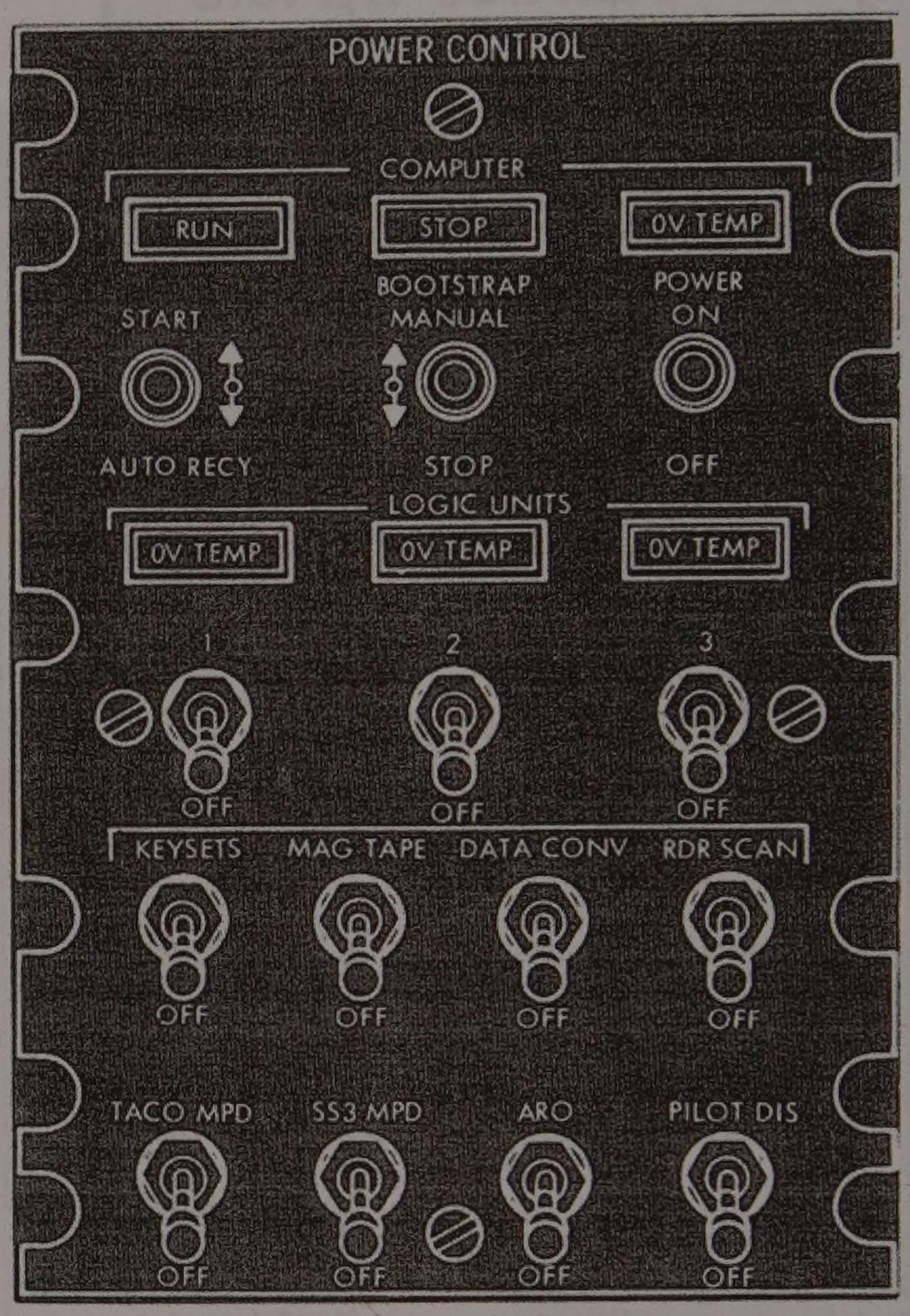
LIGHT CONTROL PANEL.

The TACCO light control panel (figure 8-15) controls intensity of console and flood lights at the TACCO station.

ICS MASTER CONTROL PANEL.

The TACCO is provided with one of four ICS master control panels to enable communications with all crewmembers and transmission monitoring of all radios. Detailed descriptions for the use of an ICS master control panel are contained in section I.

POWER CONTROL PANEL A324



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PANEL MARKING	EQUIPMENT FUNCTION
COMPUTER	
RUN	Indicator lights if ASQ-114 computer is in run mode
STOP	Indicator lights when computer is in stop mode
OV TEMP	Indicator lights if overtemperature exists in computer euqipment
START	Starts computer operating in mode selected on computer maintenance panel, or causes computer to enter recovery bootstrap routine
Center	Normal spring-loaded position
AUTO RECY	Computer executes a manual bootstrap routine when started or when a program fault occurred during run operation

Figure 8-13. Power Control Panel A324 (Sheet 1 of 2)

POWER CONTROL PANEL A324, (Cont)

PANEL MARKING	EQUIPMENT FUNCTION
COMPUTER (Cont)	
BOOT-STRAP	
MANUAL	Causes computer to enter bootstrap mode for a single start sequence
CENTER	Normal spring-loaded position
STOP	Stops computer program after next instruction sequence completed
POWER	
ON	Power turn-on signal applied to digital computer
OFF	Power turn-off signal applied to digital computer
LOGIC UNITS	
OV TEMP (1)	Indicator lights if overtemperature condition exists in logic unit 1
OV TEMP (2)	Indicator lights if overtemperature condition exists in logic unit 2
OV TEMP (3)	Indicator lights if overtemperature condition exists in logic unit 3
1/OFF	Operating power supplied/removed to logic unit 1 power switch
2/OFF	Operating power supplied/removed to logic unit 2 power switch
3/OFF	Operating power supplied/removed to logic unit 3 power switch
KEYSETS/ OFF	Operating power supplied to sensor stations 1, 2, pilot, and NAV/COMM station keysets
MAG TAPE/ OFF	Operating power supplied/removed to magnetic tape transports 1 and 2 or digital magnetic tape units A and B
DATA CONV/OFF	Operating power supplied/removed to synchro
RDR SCAN/ OFF	Operating power supplied/removed to radar converter (if installed*) and radar interface unit

WARNING

Radar scan converter must be turned ON whenever the APS-115 radar is turned ON. If the scan converter is left off and the APS-115 has power applied, the radar will automatically go to HV ON after warmup. HV cannot be switched to standby with the scan converter OFF.

TACO MPD/ OFF	Operating power supplied/removed to multipurpose display in TACCO station
SS^3 MPD/ OFF	Operating power supplied/removed to multipurpose display in sensor station 3
ARO/OFF	Operating power supplied/removed to auxiliary readouts
PILOT DIS/ OFF	Operating power supplied/removed to pilot display set

*Aircraft BUNO 156507 through 159329 except 158928.

Figure 8-13. Power Control Panel A324 (Sheet 2 of 2)

AISLE LIGHT CONTROL PANEL DISPLAY TEST/CONTROL PANEL

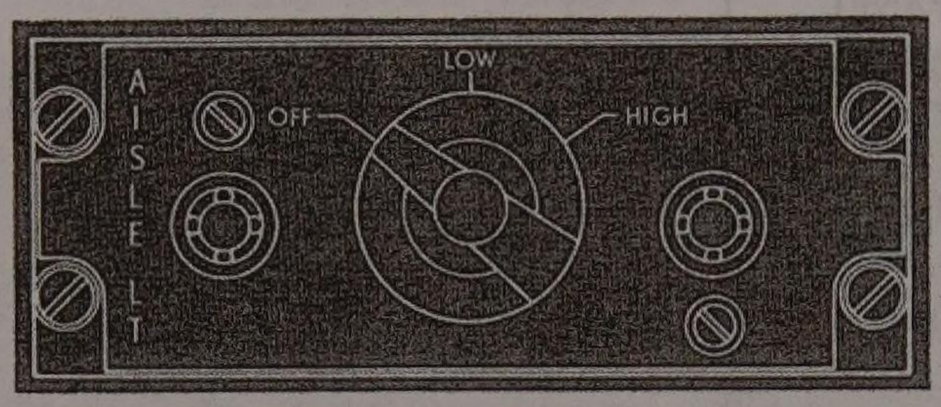

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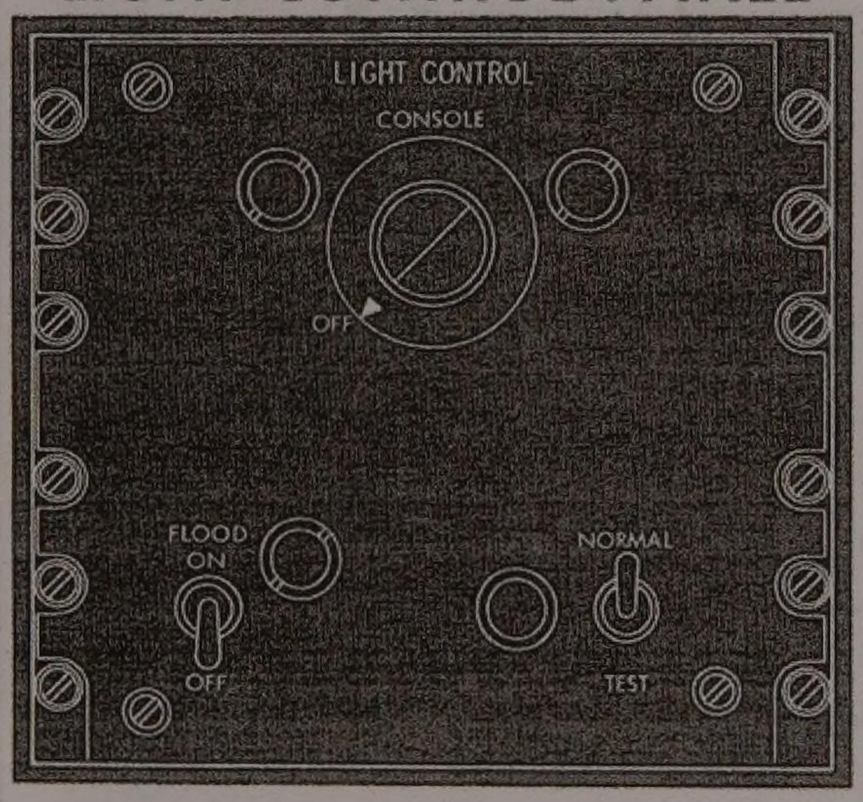
Figure 8-14. Aisle Light Control Panel

TACTICAL COORDINATOR LIGHT CONTROL PANEL



PAC-1.1(C)0008

PANEL MARKING	EQUIPMENT FUNCTION
FLOOD	
ON	Illuminates TACCO overhead floodlight
OFF	TACCO overhead floodlight off
CONSOLE	A rotary rheostat which allows the TACCO to adjust the intensity of the lights on the TACCO console. Rotation to full ccw will turn all console lights OFF
NORMAL/ TEST	A spring-loaded (NORMAL) toggle switch used to apply power to the panel annunciator lights in order to locate burned out bulbs

Figure 8-15. Tactical Coordinator Light Control Panel

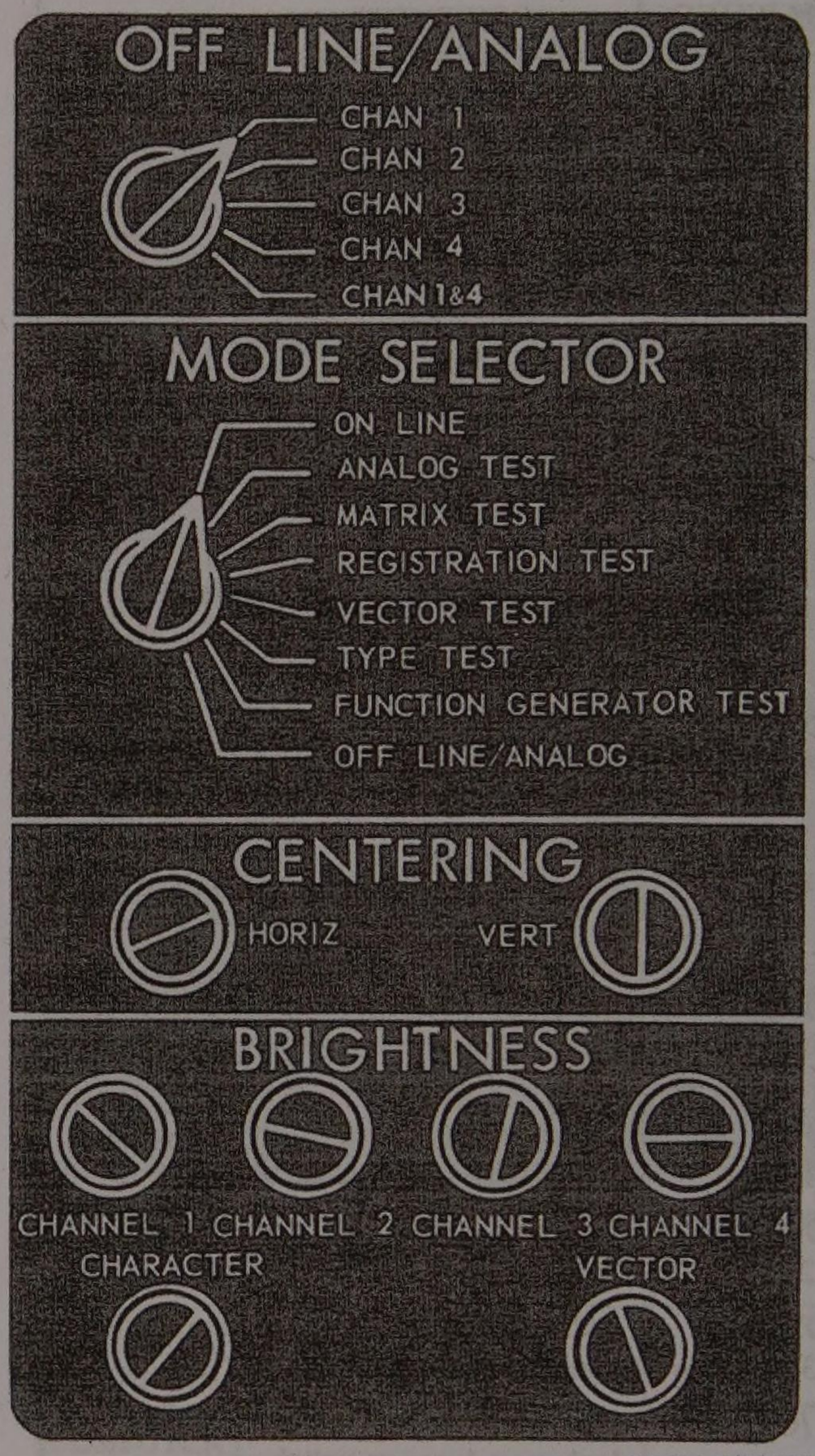


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Figure 8-16. Display Test/Control Panel (Sheet 1 of 2)

DISPLAY TEST/CONTROL PANEL.

The tactical data display modes are controlled from a display test/control panel (figure 8-16) located to the left of the display screen.

DISPLAY TEST/CONTROL PANEL (Cont)

PANEL MARKING	EQUIPMENT FUNCTION
OFF LINE/ ANALOG	See Note 2
CHAN 1	Spare
CHAN 2	Spare
CHAN 3	Spare
CHAN 4	Function generator input selected
CHAN 1 & 4	Spare
MODE SELECTOR	
ON LINE	Normal on-line operation, computer-controlled
ANALOG TEST	Analog test pattern displayed on screen (see Note 3)
MATRIX TEST	Matrix test pattern displayed on screen (see Note 3)
REGISTRA-TION TEST	Registration test pattern displayed on screen (see Note 3)
VECTOR TEST	Vector test pattern displayed on screen (see Note 3)
TYPE TEST	Type test pattern displayed on screen (see Note 3)
FUNCTION GENERATOR TEST	Function generator test pattern displayed on screen (see Note 3)
OFF LINE/ ANALOG	Analog test patterns displayed on screen (internal enable)
CENTERING	See Note 4
HORIZ	Rotation of knob controls relative horizontal positioning of display on screen
VERT	Rotation of knob controls relative vertical positioning of display on screen

PANEL MARKING	EQUIPMENT FUNCTION
BRIGHT-NESS	
CHANNEL 1 CHANNEL 2 CHANNEL 3 CHANNEL 4	Rotation of knob varies brightness of respective channel video
CHARACTER	Rotation of knob varies brightness of displayed characters
VECTOR	Rotation of knob varies brightness of displayed vectors

Note

1. Test lamp, located just below the display test/control panel, lights when mode selector switch is in any position other than on line.
2. Selected analog input channel displayed only when mode selector is in ANALOG TEST or OFF LINE/ANALOG.
3. Test patterns are located in Crew Station Maintenance Manual Tactical Coordinator Station (NAVAIR 01-75PAC-12-2).
4. Centering of display should be done in the vector test mode.
5. Overflow lamp, located next to test lamp, lights when the TACCOs MDD has power applied and has not received an End of Data (EOD) word from the ASQ-114.
6. On aircraft BUNO 158928, 159503 and subsequent, display reinitialization is required if OFF-LINE MODE is selected.

Figure 8-16. Display Test/Control Panel (Sheet 2 of 2)

ARMAMENT SYSTEM.

The P-3C weapon system comprises two subsystems, the armament (kill stores) subsystem and the ordnance (search stores) subsystem. The armament system (see figure 8-17) refers to equipment used for carriage and delivery of weapons and ordnance from the ten wing stations and eight bomb bay stations. Weapons are defined as, but not limited to, bombs, depth bombs, mines, torpedoes, missiles, rockets, practice bombs, and nuclear weapons (special weapons).

The forward interconnection box, A395, located in rack B1 directly aft of the TACCO station seat, programs jettison release of all weapons carried in the bomb bay and on wing stations, provides selection, arming, and release of bomb bay stores, and enables torpedo presetter control.

The aft interconnection box, A269, is located in sensor station No. 1 racks and provides control of arming, release, and jettison of weapons on the wing stations.

PILOT ARMAMENT CONTROL PANEL.

The pilot armament control panel (figure 8-18), PEU-72/A, is located on the forward part of the center control stand in the flight station. The panel provides the pilot with monitor capability of weapons availability and release, and master control of the armament system including jettison of all kill stores and control of opening and closing bomb bay doors.

The pilot armament control panel contains manual switches, computer-controlled cue lights, and hardware-controlled cue lights, which are not computer interfaced. These switches (identified by type function) and cue lights are listed as follows:

a. MASTER ARM switch (AA) and cue light.

b. SRCH POWER switch (AA) and cue light.

c. BOMB BAY door switch (AA) and cue light.

d. SONO DISABLED cue light (hardware-controlled).

e. ARM HAZARD cue light (hardware-controlled).

f. KILL READY cue light (computer-controlled).

g. JETTISON switch (not computer interfaced).

h. SPECIAL WEAPON STATION SELECT switch and cue light (computer-interfaced).

i. DROP-HOLD switch (not computer interfaced).

Two components not under computer control on the pilot armament control panel associated with ordnance subsystems are the SRCH PWR switch and the SONO DISABLED cue. The SRCH PWR switch supplies the ordnance subsystem with the electrical power necessary to launch a search store. The SONO DISABLED cue indicates to the pilot that the sonobuoy safety switch located at fuselage station 785 is in the SAFE position. This switch keeps power from the search stores system during external loading procedures on the ground. The SRCH PWR switch is, however, interfaced with the computer in that the search power monitor input indicates when the switch is in the ON position. The cue light is interfaced with the computer. The following seven components on the pilot armament control panel are associated with the armament subsystem.

1. The MASTER ARM switch, which supplies the armament subsystem with the electrical power necessary to arm and launch a kill store. This switch is interfaced with the computer (input only—program cannot activate this switch).

2. The BOMB BAY switch, which controls the position of the bomb bay doors, opened or closed, according to the position of the switch. This switch is not interfaced with the computer. The status of the bomb bay doors (opened or closed) is known by the program.

3. The SPL WPN (special weapon) switch, which is used by the pilot to designate one of the three special weapon stations for release. The rotation of this switch automatically generates an input word to the program (if the MASTER ARM switch is ON) that indicates the special weapon station selected. Only one station at a time may be selected by this switch.

4. The ARM HAZARD cue light, which indicates to the pilot that a malfunction in the system has made it impossible to release a weapon in on-line mode by positioning the MASTER ARM switch to ON. This cue light has no computer interface.

5. The JETTISON switch, which jettisons all the stores on weapon stations from the aircraft. This switch has no computer interface.

6. The DROP-HOLD switch, which controls the release of all special weapons. It must be in the DROP position for a special weapon launch command to be successfully implemented. This switch is not computer interfaced.

7. The KILL READY (kill store ready) cue light, which is illuminated by the computer program after all preparations for the release of a weapon have been completed. This light indicates to the pilot that a weapon is now in a ready state and capable of release.

ARMAMENT CONTROL SYSTEM BLOCK DIAGRAM

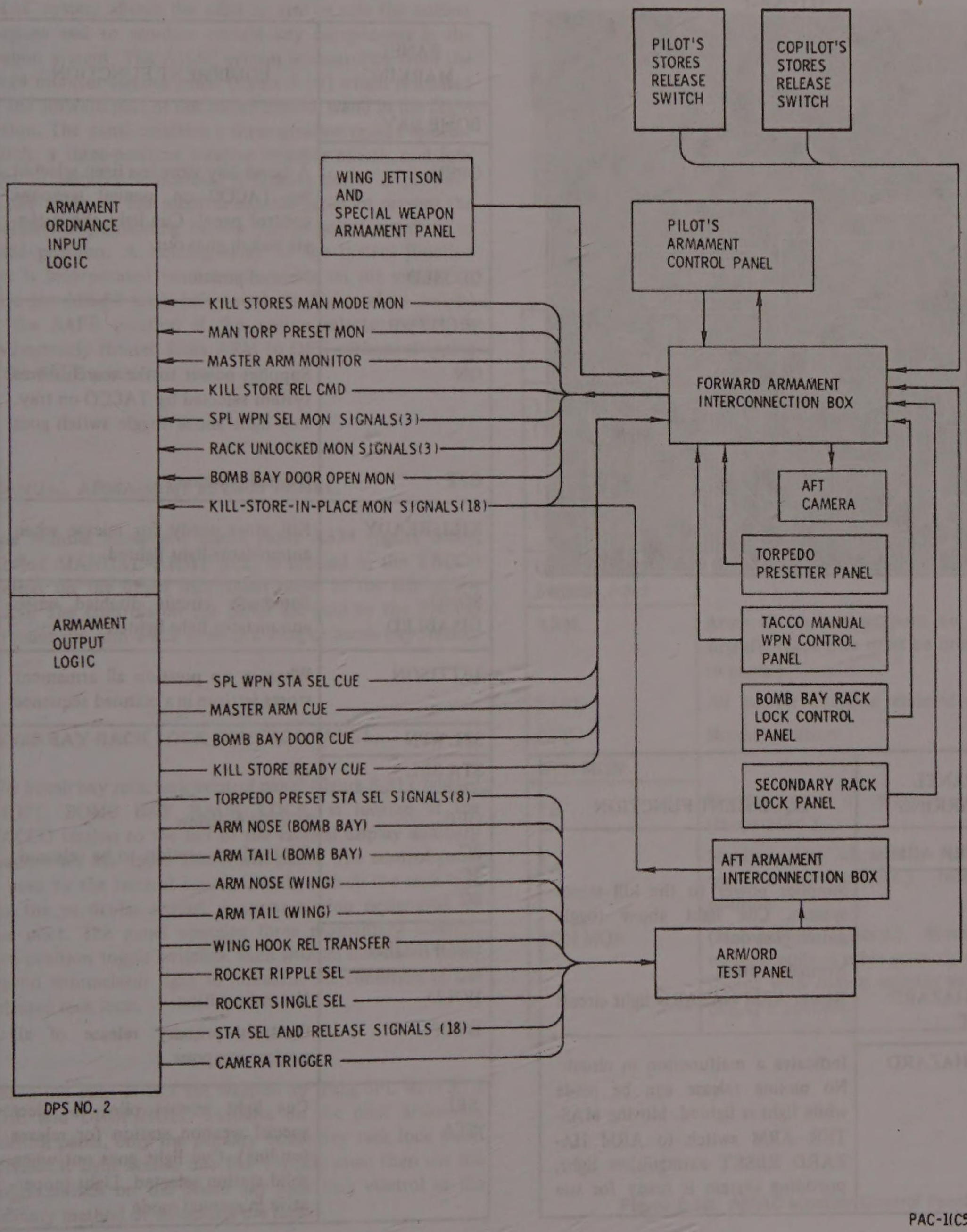
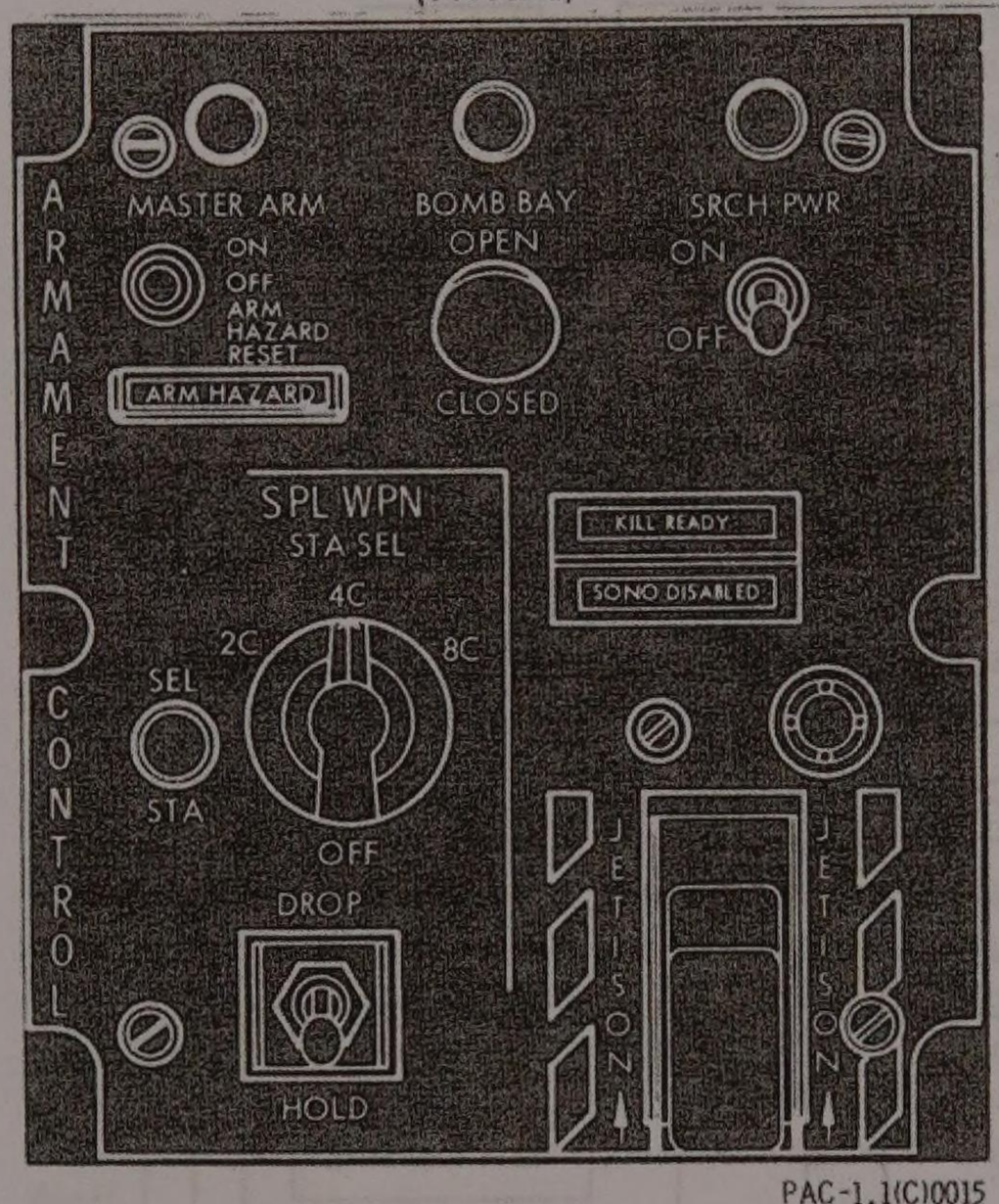


Figure 8-17. Armament Control System Block Diagram

PILOT ARMAMENT CONTROL PANEL
(TYPICAL)



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PANEL MARKING	EQUIPMENT FUNCTION
MASTER ARM	
ON	Supplies power to the kill stores system. Cue light above toggle switch goes out
OFF	Normal position
ARM HAZARD RESET	Resets ARM HAZARD light circuit
ARM HAZARD light	Indicates a malfunction in circuit. No on-line release can be made while light is lighted. Moving MASTER ARM switch to ARM HAZARD RESET extinguishes light, providing system is ready for use

PANEL MARKING	EQUIPMENT FUNCTION
BOMB BAY	
OPEN	A bomb bay store has been selected by TACCO on manual weapons control panel. Cue light above toggle switch goes out
CLOSED	Normal position
SRCH PWR	
ON	Supplies power to the search stores system selected by TACCO on tray. Cue light above toggle switch goes out
OFF	Normal position
KILL READY	Kill store ready for release when annunciator light lighted
SONO DISABLED	Sonobuoy circuit disabled when annunciator light lighted
JETTISON	When in up position all armament stores jettison in a planned sequence
SPL WPN	
STA SEL	
OFF	Normal position
2C 4C 8C	Pilot selects station to be released.
DROP/HOLD	
HOLD	Normal position
DROP	Controls primary release of all nuclear weapons
SEL STA	Cue light advises pilot to select special weapon station for release (on-line). Cue light goes out when valid station selected. Light inoperative in manual mode

Figure 8-18. Pilot Armament Control Panel

AMAC MONITOR CONTROL PANEL.

The control and monitor of nuclear (special) weapons is accomplished through the T-414 AMAC system. The AMAC system allows the pilot to arm or safe the nuclear weapons and to monitor certain key components in the weapon system. The AMAC system is controlled from the T-414 monitor control panel (figure 8-19) which is located on the forward part of the center control stand in the flight station. The panel contains a three-position option selector switch, a three-position weapon monitor switch, and four pairs of numeric indicators. A locking device is provided on the cover of the monitor control panel to prevent the inadvertent positioning of the option selector switch to ARM position. A holding relay in the system junction box is incorporated to maintain power on the system to drive the MK-57 ready-safe switch (in-flight safety switch) to the SAFE position if the option selector switch is inadvertently rotated from ARM to OFF without stopping in the SAFE position.

MANUAL ARMAMENT SELECT PANEL.

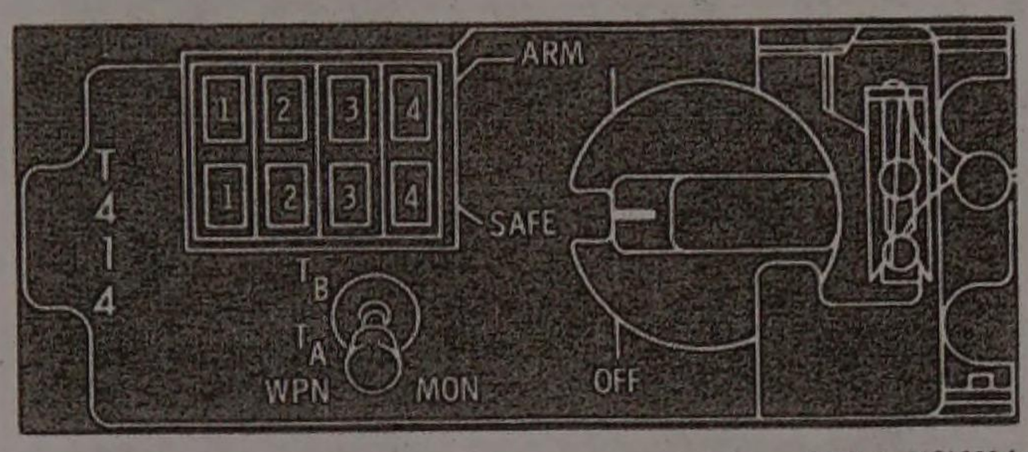
The manual armament select panel A334 (figure 8-20), labeled MANUAL ARMT SEL, is located in the TACCO station on the upper instrument panel to the left of the ARO. The controls on the panel are used by the TACCO to manually arm a kill store at a wing or bomb bay station.

BOMB BAY RACK LOCK CONTROL PANEL.

The bomb bay rack lock control panel (figure 8-21), labeled ARMT, BOMB BAY RACK LOCK, is located at the TACCO station to the left of the tactical display auxiliary readout on the upper instrument panel. The control panel is used by the tactical coordinator to unlock the rack lock for the particular special weapons station designated by the pilot. The panel contains three momentary contact, two-position toggle switches, each with an associated three-legend annunciator light to represent the condition of the selected rack lock.

When the pilot selects the weapon by using SPL WPN STA SEL and DROP/HOLD switches on the pilot armament control panel, only the primary bomb bay rack lock panel UNLOCK light comes on. The TACCO must then use the toggle switch on the bomb bay rack lock control as the primary method of unlocking the rack.

AMAC MONITOR CONTROL PANEL



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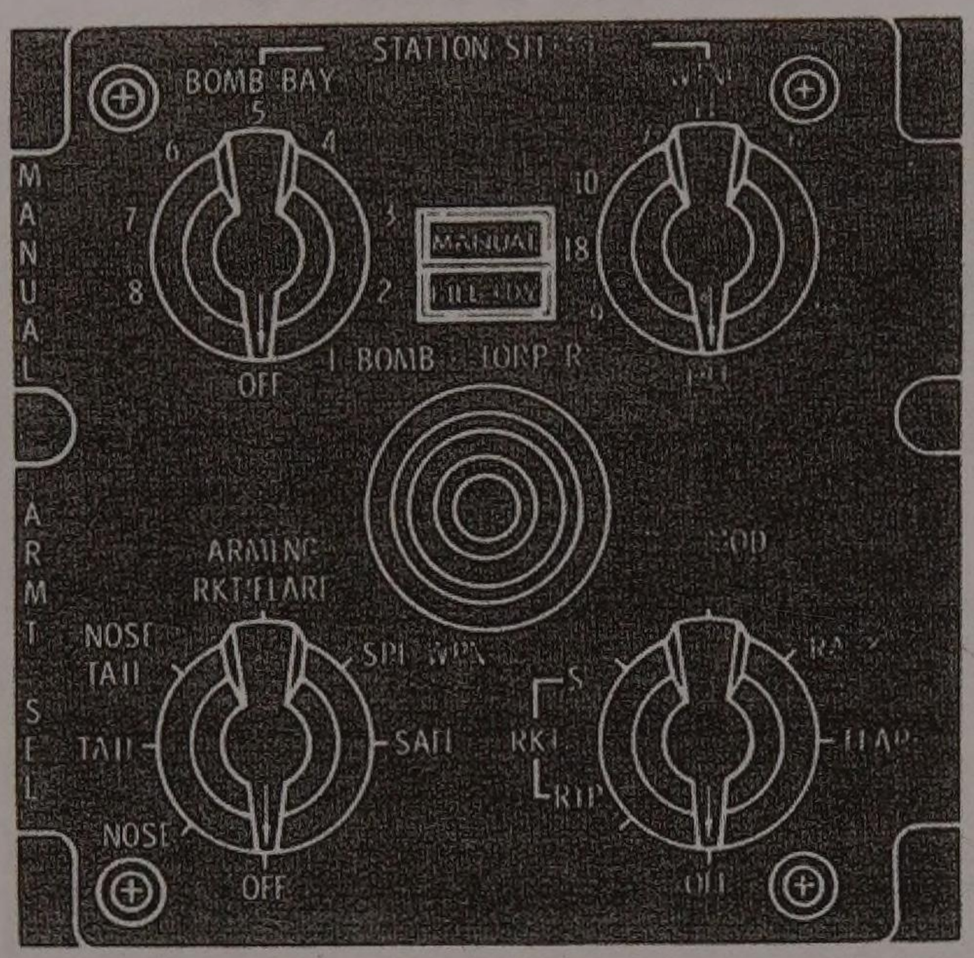
PANEL MARKING	EQUIPMENT FUNCTIONS
1 2 3 4 (Top Row)	Four arm monitor lights which when lighted red indicate armed condition of nuclear weapons
1 2 3 4 (Bottom Row)	Four monitor lights which when lighted green indicate safe condition of nuclear weapons
Option Selector Switch	
ARM	Arms all nuclear weapons on the aircraft. (Seal wire must be broken to move.)
SAFE	All nuclear weapons rendered safe
OFF	Normal position
WPN MON	
T_B	Monitor time of weapon burst (Inoperative.)
T_A	Monitor time of arming nuclear weapon. (Inoperative.) Normal position
WPN MON	(Momentarily placed.) Monitors weapon pullout cable properly connected with option selector switch in SAFE position

Figure 8-19. AMAC Monitor Control Panel

MANUAL ARMAMENT SELECT PANEL



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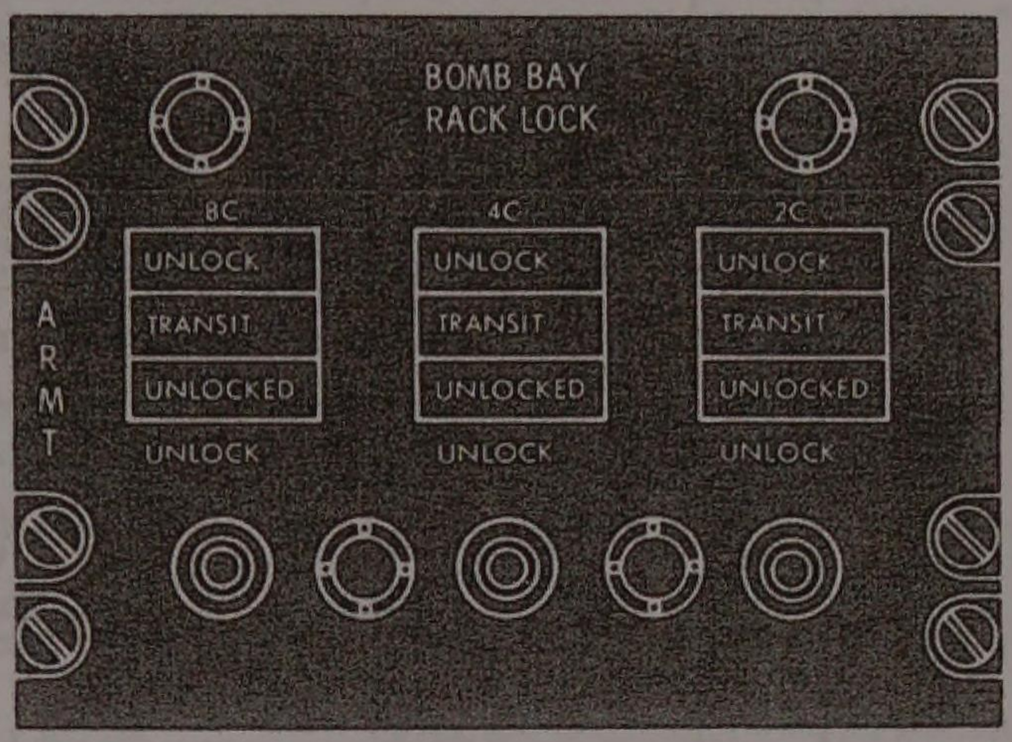
PANEL MARKING	EQUIPMENT FUNCTION
STATION SELECT	
BOMB BAY 1 2 3 4 5 6 7 8	Rotary switch selects bomb bay numbered weapon station for armament release
OFF	All manual selections to the bomb bay inhibited
WING 9 18 10 17 11 16 12 15 13 14	Rotary switch selects numbered wing weapon station for armament release
OFF	All manual selections to the wings inhibited

PANEL MARKING	EQUIPMENT FUNCTION
MANUAL	Indicator lights to indicate TACCO has made a manual mode selection
KILL RDY	Indicator lights to indicate selected weapon ready for release
BOMB-TORP REL	Pushbutton releases weapons only when REL MODE rotary switch is set to RACK REL
ARMING rotary switch	
NOSE	Selects nose arming for selected weapon
TAIL	Selects tail arming for selected weapon
NOSE TAIL	Selects nose and tail arming for weapon selected for release
RKT FLARE	Selects nose arming, if arming required, for store selected for release
SPL WPN	Switch is necessary part of preparations for release of special weapon. The switch does not, however, arm the special weapon
SAFE	Enables selective emergency release of any conventional store in safe condition if REL MODE switch in RACK REL position
OFF	All manual arming functions inhibited
REL MODE rotary switch	
RKT RIP	Selects rapid sequential rocket firing mode
RKT S	Selects single rocket firing mode
RACK REL	Selects bomb rack (hook) release mode for weapon station selected
FLARE	Selects flare release mode for wing weapon station selected
OFF	Manual selection of weapon release mode inhibited

Figure 8-20. Manual Armament Select Panel

PANEL MARKING	EQUIPMENT FUNCTION
8C	
UNLOCK	Light advises TACCO to operate 8C rack unlock toggle switch
TRANSIT	Light indicates 8C rack lock mechanism moving from one position to another
UNLOCKED	Light indicates 8C rack unlocked
UNLOCK	Momentary 2-position toggle switch operated to apply power to 8C rack lock mechanism to unlock rack
4C	
UNLOCK	Light advises TACCO to operate 4C rack unlock toggle switch
TRANSIT	Light indicates 4C rack lock mechanism moving from one position to another
UNLOCKED	Light indicates 4C rack unlocked
UNLOCK	Momentary 2-position toggle switch operated to apply power to 4C rack lock mechanism to unlock rack



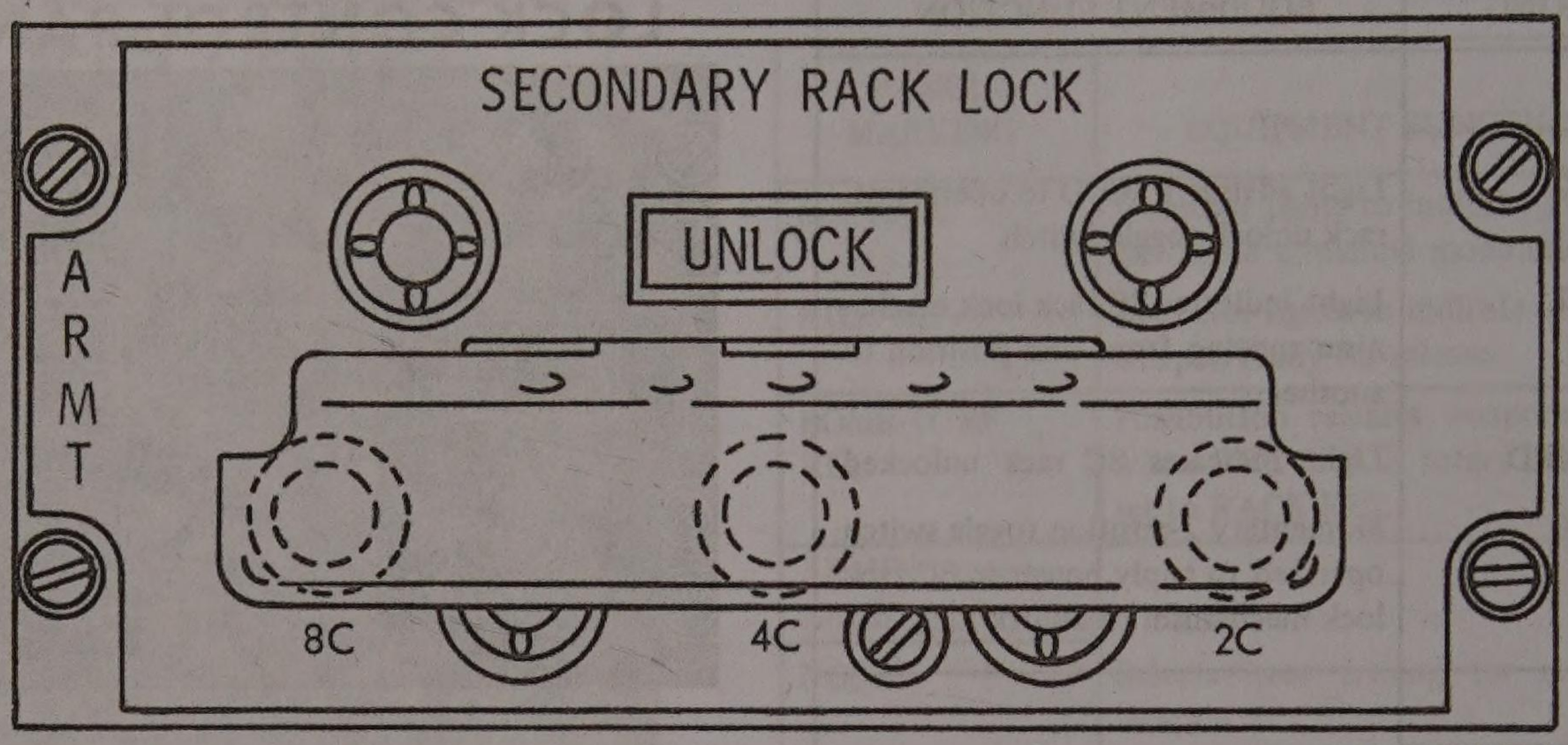
PANEL MARKING	EQUIPMENT FUNCTION
2C	
UNLOCK	Light advises TACCO to operate 2C rack unlock toggle switch
TRANSIT	Light indicates 2C rack lock mechanism moving from one position to another
UNLOCKED	Light indicates 2C rack unlocked
UNLOCK	Momentary 2-position toggle switch operated to apply power to 2C rack lock mechanism to unlock rack

Figure 8-21. Bomb Bay Rack Lock Control Panel

SECONDARY RACK LOCK PANEL.

The secondary rack lock panel (figure 8-22) is located in the TACCO station above the bomb bay rack lock control panel. The panel is used by the TACCO as a secondary unlock for the selected nuclear weapons station. The panel contains three guarded pushbutton switches and an indicator light. If the primary method fails to unlock the rack, the pilot should then begin the secondary method of weapon release by using the SPL WPN STA SEL and DROP/HOLD switches on the special weapon secondary release panel. Then the TACCOs only method of unlocking the selected rack is by pressing the associated pushbutton on the secondary rack lock panel. This secondary method uses the UNLOCK lights on both rack lock panels, but results in an UNLOCKED indication only at the primary bomb bay rack lock control panel. Once the rack is unlocked, he may return to the primary method of weapon release.

SECONDARY RACK LOCK PANEL, 962046-101



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PANEL MARKING	EQUIPMENT FUNCTIONS
8C	Guarded pushbutton switch operated to apply power to station 8C secondary rack unlock mechanism to unlock the bomb rack
4C	Guarded pushbutton switch operated to apply power to station 4C secondary rack unlock mechanism to unlock the bomb rack

PANEL MARKING	EQUIPMENT FUNCTIONS
2C	Guarded pushbutton switch operated to apply power to station 2C secondary rack unlock mechanism to unlock the bomb rack
UNLOCK light	Advises TACCO to operate selected station secondary unlock pushbutton switch. Illuminates only when bomb bay doors are fully open

Figure 8-22. Secondary Rack Lock Panel

TORPEDO PRESETTER PANEL.

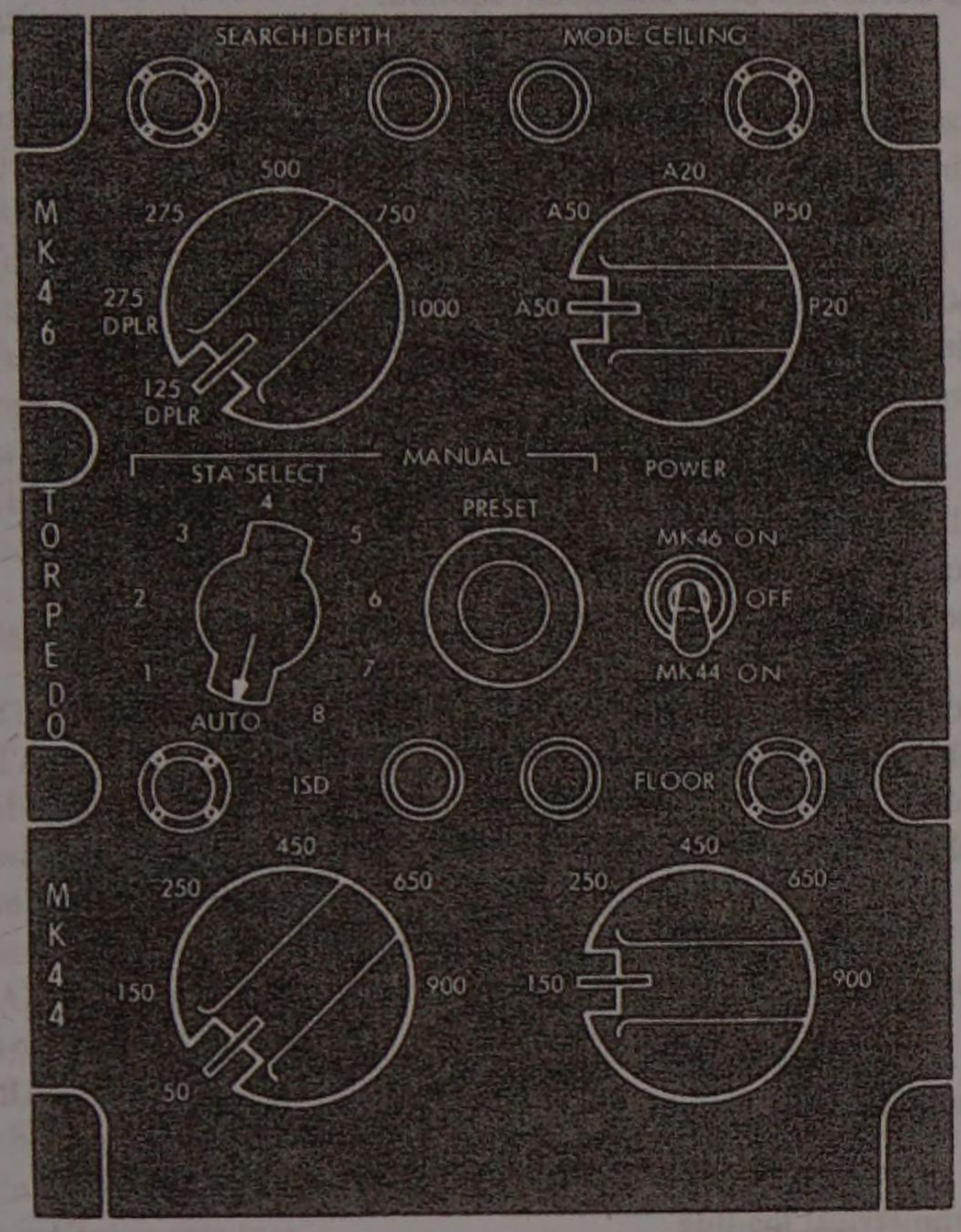
The torpedo presetter panel (figure 8-23) is provided to set a selected torpedo for the proper depth and search mode. The panel is located on the upper instrument panel at the TACCO station just outboard of the ARO.

NEW When MK-46 torpedoes have been selected for off-line release, the TACCO selects the bomb bay station and the torpedo by positioning the MK-46/MK-44 switch on torpedo presetter panel to MK-46. The TACCO then sets the two rotary switches to the depth values desired and presses the PRESET pushbutton on the torpedo presetter panel. The PRESET pushbutton is held until the indicator light goes out, indicating that the presetting operation has been completed. The presetting operation requires approximately 3 seconds. When this function is performed on-line, the computer selects the torpedo and also presets it; however, the TACCO must still select the torpedo depth setting desired, place STA SELECT to AUTO and apply power.

ARMAMENT/ORDNANCE TEST PANEL.

The armament/ordnance test panel (figure FO-16), labeled TEST PANEL, ARMAMENT ORDNANCE, mounted above the sonobuoy stowage rack in the ordnance station, is used to check continuity of aircraft armament and ordnance circuits. Test signals are initiated by pressing a pushbutton on the ordnance panel directly below, and indicators are lighted (white) in a predetermined pattern if circuits are intact. A circuit fault is discovered if an indicator is not lighted but should be. The indicators are identified by the panel nomenclature of the circuit tested.

TORPEDO PRESETTER PANEL



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PANEL MARKING	EQUIPMENT FUNCTION
SEARCH DEPTH	
125 DPLR 275 DPLR 275 500 750 1000	Position of 6-position rotary selector switch sets search depth preset into MK-46 torpedo at weapon station selected. Light at upper right of switch lights while search depth presetting function is in progress
MODE CEILING	
A50 A50 A20 P50 P20	Position of 5-position rotary selector switch sets mode ceiling for a MK-46 torpedo at weapon station selected. Light at upper left of switch lights while mode ceiling presetting function is in progress

PANEL MARKING	EQUIPMENT FUNCTION
POWER	
MK 46 ON	Power provided to presetter panel and MK-46 selected for presetting
OFF	Normal position
MK 44 ON	(Not Used)
MANUAL STA SELECT	
AUTO 1 2 3 4 5 6 7 8	Program determines weapon station selection to which presetting signals will apply. (Inoperative in off-line mode.) Position 1 through 8 of rotary selector switch determines weapon station selection to which presetting signals apply. (Places torpedo preset system in off-line mode.)
PRESET	Pushbutton-switch pressed to connect selected preset functions to torpedo loaded at weapon station selected
ISD	(Not Used)
50 150 250 450 650 900	
FLOOR	(Not Used)
150 250 450 650 900	

NEW

Figure 8-23. Torpedo Presetter Panel

NUCLEAR WEAPONS (SPECIAL WEAPONS), OPERATING PROCEDURES.

Note

If a conflict exists between procedures in this manual and those contained in the applicable nuclear weapons checklist, the nuclear weapons checklist procedures shall take precedence.

For flight crew operating procedures, MK-57 nuclear weapons monitoring, normal release, jettison release, abort, and after landing procedures, refer to the Nuclear Weapons Checklist.

MODES OF OPERATION.

The modes of operation of the armament system are automatic and manual. The automatic (on-line) mode is the primary operating mode and utilizes the computer, logic unit 2, pilot keyset and display, and the TACCO multipurpose data display and tray. The manual (off-line) mode is used as a backup system for the automatic mode, and utilizes the pilot armament control panel, TACCO manual armament select panel, bomb bay rack lock panel, and the search stores manual launcher select panel.

Automatic Mode.

The automatic mode permits a method of kill store and search store management which allows maximum flexibility and control of the armament/ordnance system, while minimizing the amount of necessary manual action required by the aircraft crew. The armament system is in the automatic mode when all of the selector switches on the TACCO manual armament select panel are in the OFF position. The TACCO must still select the torpedo depth setting desired, place STA SELECT to AUTO, and apply power.

In the automatic mode, the armament system is designed to have the computer and data processing system provide the following functions:

1. Maintain an up-to-date inventory of all kill stores on the aircraft and provide weapon inventory that can be called up for display on the TACCO ARO.

2. Determine the availability of a selected weapon and select the weapon station from which the weapon is to be released.

3. Energize the armament system relays at the proper time, in the proper sequence, and for the proper time duration to accomplish a weapon release under joint computer and operator control.

4. Instruct the pilot (or TACCO), by cueing, to operate the bomb bay door switch as required.

5. Present the operator with alternatives for which decisions are required, and furnish alerts to the operator to bring important developments to his attention.

6. Calculate and initiate fly-to-point weapon releases and intervals between releases for train releases, and furnish release commands in response to pilot or TACCO release commands.

7. Secure the armament system following each weapon release, including terminating arming outputs, checking store-in-place status, updating the inventory, and preparing the system for the next weapon selection.

Following the manual weapon selection by the TACCO or pilot, the computer locates one or more of the desired stores in memory. The computer chooses the store to be released by adhering to the following priorities:

a. Wing store stations have priority over the bomb bay station.

b. Outer wing stations have priority over inboard stations.

c. Wing stations are selected so as to maintain nearly symmetrical loading.

d. Port wing has priority over the starboard wing (except for c).

e. Bomb bay stations priority are 8, 7, 6, 5, 4, 3, 2, and 1.

Mines are the only weapons that can exercise the total priority scheme because they are the only weapons that are normally dropped from both the wing and bomb bay stations.

Within the aircraft armament system circuitry, the release of a blocked store is prevented, regardless of what the computer might select.

The purpose of wing store priority is to maintain wing balance as the stores are expended. This priority does assume that weapons of a particular type are on the wing, and will be loaded symmetrically; however, if an odd number of stores is loaded it is not important which wing carries the odd store.

For weapons with no choice in arming, the arming is programmed in the operational program. The choice is made by keyset pushbutton actuation. The computer initiates the actuation of buffer relay (nose and/or tail arming, wing

or bomb bay) which in turn energizes the armament system relay to supply armament power to the arming solenoids within the bomb racks. The arming is then enabled. The arming solenoids, when energized, grip arming wires and as the weapon is released from the aircraft the wire is pulled from the weapon, starting the arming process. Weapon arming should be initiated a minimum of 50 ms (milliseconds) prior to a weapon release in order to be sure the arming solenoid has been energized. The arming function must remain active continuously during weapon release and for 10 seconds following the release. Up until weapon release the arming may be changed, or cancelled (in which case the weapon would be released in an unarmed condition as in the case of jettisoning).

Manual Mode.

The manual mode is an off-line mode that provides the TACCO with management control of all kill and search stores. In this mode, the TACCO selects the bomb bay or wing station for dropping, for arming, and for the release mode of the selected weapon, using controls on his manual armament select panel. The pilot is cued (by the MASTER ARM indicator light) to move the MASTER ARM switch to ON, and to open the bomb bay doors (by the BOMB BAY indicator light) if required. The DPS is inhibited in the manual mode so that it has no control of any kill store function; the MANUAL mode annunciator indicator lights to display this fact.

When the station, arming, and release modes have been selected, master arm power is on, and the bomb bay doors are open (if required for the weapon), the KILL READY annunciator lights on the pilot armament control panel and the TACCO manual armament selector panel light (provided the selected weapon station is loaded). The store may then be released by the pilot, the copilot, or the TACCO, using a release switch. The indicator goes out when the selected store has been released.

Manual Mode Procedures. Operate the armament system in the manual mode as follows:

1. TACCO selects weapon station on manual armament select panel. System enters manual mode.

Note

When selected, the tenth position on the STATION SELECT BOMB BAY, located between 8 and OFF, or the twelfth position on the STATION SELECT WING, located between 9 and OFF, will inhibit the manual release mode.

If the station selected is in the bomb bay, the BOMB BAY cue light on the pilot armament control panel lights, instructing the pilot to move the BOMB BAY switch to the open position. The bomb bay cue light remains on until the bomb bay doors are fully open.

2. TACCO moves arming switch on manual armament select panel to type of arming desired for the type of store selected.

3. Position REL MODE switch on TACCO manual armament select panel to correspond to the type of weapon and mode of release. The choices are rocket ripple (rapid sequential firing), rocket single, flare, and rack release (applicable for torpedoes, mines, and any store for selective emergency release).

The light advises the pilot that he should move the MASTER ARM switch to the ON position in order to continue with the armament release procedure.

Note

The pilot MASTER ARM switch gives the pilot final control over the release of kill store from the aircraft. By switching the MASTER ARM switch to OFF the pilot can at any time interrupt all release attempts and prevent release of kill stores.

4. If torpedoes are selected for release, TACCO presets MK-46 torpedoes by setting switches correctly on the torpedo presetter panel.

The KILL READY annunciator lights on the pilot armament control panel and the TACCO manual armament select panel illuminate. These lights indicate that if a store release pushbutton is pressed, a kill store will be released. If the station selected is in the upper store layer of the bomb bay (odd-numbered stations), and there are stores in the lower layer (even-numbered stations) which will interfere with its release, the KILL READY light will not illuminate.

The KILL READY lights indicate that a store can be released by pressing either the pilot or copilot control wheel STORES REL pushbutton or the TACCO BOMB-TORP REL pushbutton (on the TACCO manual armament select panel). The BOMB-TORP REL pushbutton can only release a store when a rack release has been selected as the release mode. (This is the normal release mode for bombs, torpedoes and mines.) When the KILL READY light goes out, no store will be released if any of the release pushbuttons are pressed. Following a release of a kill store, the KILL READY light goes out.

For emergency selective release of a single station, the same procedure is followed except the ARMING switch is positioned to SAFE.

SECURING THE SYSTEM.

Following the release of a kill store or series of kill stores, the TACCO places all switches on the TACCO manual armament select panel to OFF, which causes the MANUAL light to go out. The pilot observes a lighted BOMB BAY cue light and a lighted MASTER ARM cue light which advise him to move the MASTER ARM switch to OFF and close the bomb bay doors. The lights remain lighted until the function has been completed. The armament system has now been returned to its original state.

ARMAMENT SAFETY CIRCUIT DISABLE SWITCH.

The ARMT SAFETY CKT DISABLE switch, located on the forward electronics circuit breaker panel, is a momentary contact switch used to bypass the landing gear lever switch thus permitting operation of the kill stores systems when the gearhandle is selected down. The MASTER ARM switch must be turned on before actuation of the DISABLE switch. Positioning the switch to DISABLE supplies power to the kill stores systems. Holding power for the relay is supplied through the MASTER ARM switch.

Note

The jettison function is rendered inoperative by landing gear scissor switches when aircraft weight is on both main landing gear mounts, regardless of the position of the ARMT SAFETY CKT DISABLE switch.

ARMAMENT STORES JETTISON.

WARNING

Do not activate WING ONLY JETTISON after activating JETTISON because the bomb bay doors will not close.

In an emergency situation, the pilot initiates the jettison function to accomplish an unarmed release of kill stores. The pilot has the option of either releasing only the stores on the wings or both bomb bay and wing stores. The panel on the center control stand just forward of the power levers, labeled ARMAMENT, WING ONLY, contains one guarded, two-position, momentary action, toggle switch, labeled JETTISON (see figure 8-24). Operating the WING ONLY JETTISON switch to the spring-loaded forward position and held initiates a sequence in the programmer module to jettison all wing stores in an unarmed condition in approximately 8 seconds. The wing stores are jettisoned in pairs, one from each side of the aircraft from outboard to inboard at 2-second intervals. The panel on the center control stand just forward and to the right of the power levers, labeled ARMAMENT CONTROL, contains one guarded, two-position, alternate action, toggle switch, labeled JETTISON. (See figure 8-18.) Placing the JETTISON toggle switch to the jettison position initiates the jettison of all kill stores automatically from the aircraft in approximately 20 seconds. The jettison function can be initiated at any time, regardless of whether or not a store selection is in progress, and takes precedence over any other weapon functions in the on-line or off-line mode.

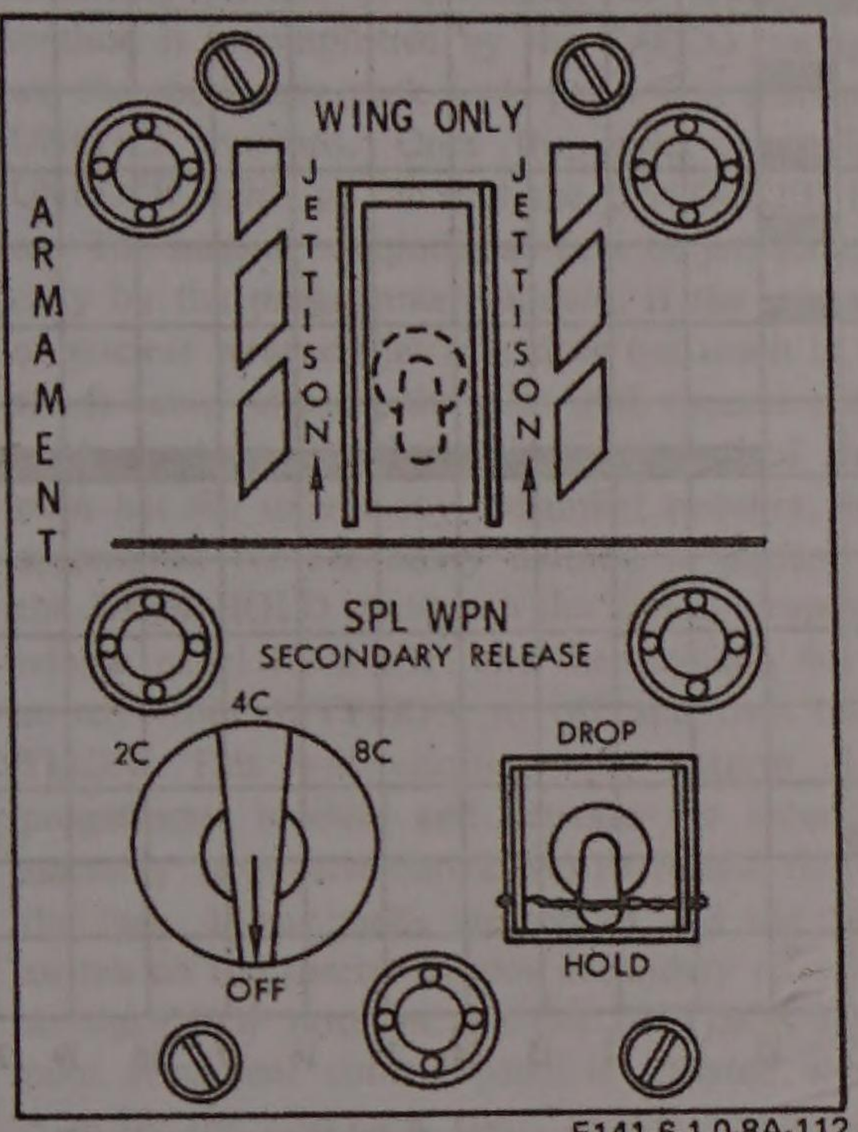
Armament Jettison Circuit.

Power to operate the armament jettison circuit is supplied by six circuit breakers located on the forward electronic circuit breaker panel. Five of these circuit breakers supply 28 volts dc and are placarded: LWG, RWG, CONT, BOMB BAY DOOR CONT and BOMB BAY STORES. These five circuit breakers receive power from the ARMAMENT JETTISON circuit breaker on the monitorable essential dc bus section on the forward load center lower circuit breaker panel. The remaining circuit breaker, placarded PROGRAMMER ϕA, supplies 115 volts ac to operate the programmer module (2A8). This circuit breaker receives its power through a circuit breaker placarded ARMAMENT CKT BKR PNL ϕA located on the monitorable essential ac bus section of the forward load center circuit breaker panel. Additionally, if nuclear weapons are to be jettisoned, it is necessary that the three circuit breakers placarded BOMB RACK LOCK PWER-STBD, CTR, and PORT, located on the monitorable essential dc bus section of the forward load center lower circuit breaker panel, be closed. The SPL WPN SECONDARY RELEASE CONT PWR DC circuit breaker, located on the forward electronic circuit breaker panel, must also be closed. This circuit breaker supplies power to operate the bomb rack lock actuators.

The jettison release pulses are generated in the programmer module located in the forward armament interconnection box. A complete cycle of operation will occur in approximately 20 seconds. At the completion of a time cycle the unit returns to the normal starting position, and remains there to prevent recycling until power is interrupted. (See figure 8-25.)

The JETTISON switch, when actuated, applies power to the programmer module which executes its full cycle. Wing only jettison is accomplished by actuating the WING ONLY JETTISON switch for approximately 8 seconds. The WING ONLY JETTISON switch, when actuated, applies power to the programmer module and interrupts control of both the bomb bay stores and the bomb bay doors by the programmer module.

ARMAMENT WING ONLY, SPL WPN SECONDARY RELEASE PANEL



PANEL MARKING	EQUIPMENT FUNCTION
WING ONLY JETTISON	When actuated initiates a sequence to jettison all wing stores in an unarmed (safe) condition, in approximately 8 seconds. The wing stores are jettisoned in pairs, one from each side of the aircraft (stations 9 and 18, 10 and 17, 11 and 16, and so forth) at 2-second intervals
SPL WPN SECONDARY RELEASE	
OFF	Normal position
2C	Selects bomb bay station 2C for secondary unlock and/or release
4C	Selects bomb bay station 4C for secondary unlock and/or release
8C	Selects bomb bay station 8C for secondary unlock and/or release
SPL WPN SECONDARY RELEASE	
HOLD	Normal position
DROP	Controls the secondary release of all nuclear weapons

Figure 8-24. Armament Wing Only, Special Weapon Secondary Release Panel

When power is applied to the programmer module, the jettison operation commences in the following order: the bomb bay doors open; at the same time the wing stores start jettisoning in pairs, one from each wing in a symmetrical sequence, beginning with the outboard stations (9 and 18) and continuing through the inboard stations. Providing the bomb bay doors are open, power from the programmer sends three impulses to release the bomb bay stations. The first impulse releases the lower stations 2, 4, 6, and 8, the second releases the upper stations 1, 3, 5, and 7, and a third impulse clears any hung stores; the last step is the bomb bay doors close. The store sensing switches at stations 2, 4, 6, and 8 prevent the release of an upper store until the lower store blocking it has been released. The programmer pulse is fed through the energized stations 2C, 4C, and 8C relays for station C release.

The jettison function is rendered inoperative by landing gear scissor switches when aircraft weight is on both main landing gear mounts.

Note

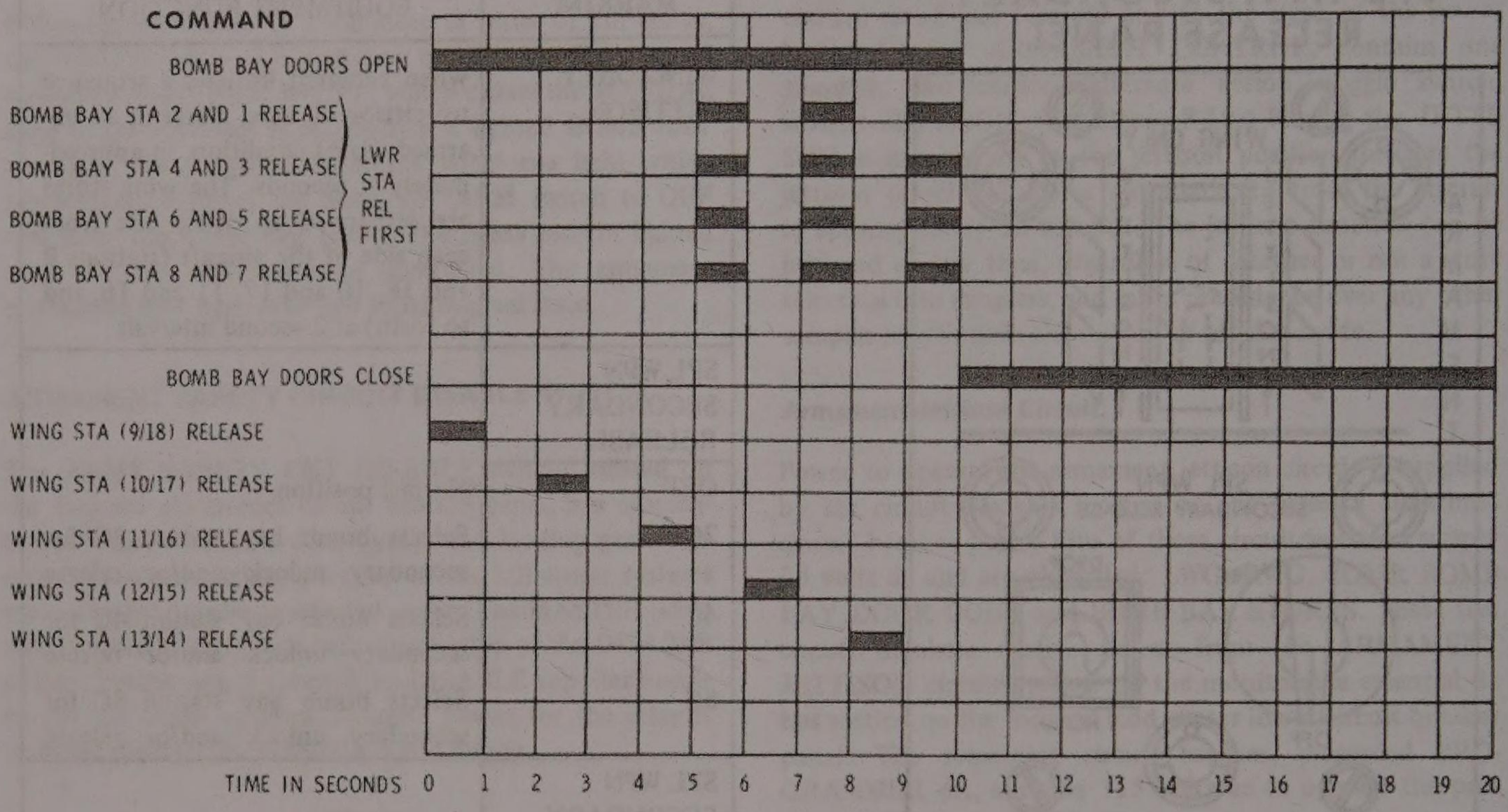
- The energized jettixon control relay open contacts interrupt the kill store 28-volt dc arming power. This prevents the arming of conventional stores during jettisoning. The nuclear stores have separate arming control through the AMAC system which is independent of the jettison system.
- The jettisoning cycle can be terminated at any point during the cycle by turning the JETTISON switch to off, which will return the programmer module to the start position.

NUCLEAR WEAPONS JETTISON.

WARNING

Jettisoning of nuclear weapons must be accomplished utilizing the appropriate NAVAIR nuclear weapons checklist to prevent the possible jettisoning of an armed nuclear weapon(s).

JETTISON TIMING CHART



NOTE

1 DURING BOMB BAY OPEN CYCLE, POWER IS APPLIED FOR 10 SECONDS BUT DOORS OPEN AT 3 TO 4 SECONDS

2 DURING BOMB BAY DOOR CLOSE CYCLE, DOORS START CLOSING AT THE ELEVENTH SECOND, ARE CLOSED AT 14 TO 15 SECONDS, BUT POWER IS APPLIED THROUGH THE TWENTIETH SECOND

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Figure 8-25. Jettison Timing Chart

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Each BRU-14 rack has two explosive cartridges. The first one is a rack unlock explosive cartridge and it provides a secondary means to unlock the rack. The cartridge is activated by pressing the corresponding rack UNLOCK button on the secondary rack lock panel at the TACCO station. The cartridge will not discharge, nor will the UNLOCK light on the secondary rack lock panel illuminate unless the bomb bay doors are fully open.

When the rack unlock cartridge is discharged, the rack is forced to unlock and cannot be relocked during that flight. The second explosive cartridge activates the secondary release assembly. Jettison using the DROP-HOLD switch on the pilot armament control panel (racks unlocked) activates the primary (electromechanical) release unit to release the store from the rack. Jettison using the DROP-HOLD switch on the special weapon secondary release panel (racks unlocked) activates this secondary release assembly to release the store from the rack. The cartridge will not discharge unless the bomb bay doors are fully open.

For jettison, all bomb bay racks carrying nuclear weapons can be unlocked simultaneously provided either nuclear weapon DROP-HOLD switch is in DROP. All nuclear release pulses go through the nuclear weapon DROP-HOLD switch. The primary method of nuclear weapons jettison is accomplished by the pilot positioning the DROP-HOLD switch to DROP and the JETTISON switch to JETTISON. Both switches are located on the pilot armament control panel.

The TACCO is cued to unlock the racks by the UNLOCK lights on the bomb bay rack lock control panel and by the UNLOCK light on the secondary rack lock panel which come on. The primary method of unlocking the racks is accomplished by the TACCO using the switches on the bomb bay rack lock control panel. To do this, the TACCO positions the toggle switches to UNLOCK causing the TRANSIT lights to come on and go off, the UNLOCK lights to remain on, and the UNLOCKED lights to come on when the racks are unlocked. The nuclear weapons can now be jettisoned automatically by the programmer

NEW NEW NEW NEW NEW NEW NEW NEW NEW NEW

module. If the UNLOCKED light has not illuminated after holding the toggle switch to the UNLOCKED position for the required 6 seconds, the TACCO shall proceed with the secondary method of unlocking the racks. This secondary method is accomplished by the TACCO raising the guard on the secondary rack lock panel and then pressing the UNLOCK buttons. Once the racks are unlocked, the UNLOCK lights go off and the UNLOCKED lights come on. The nuclear weapons can now be jettisoned automatically by the programmer module. If the primary method of nuclear weapons jettison does not result in the nuclear stores being released, the pilot shall execute the secondary method. Assuming the racks are unlocked and that the pilot has not moved any armament switches, the pilot can accomplish the secondary method of jettison by moving the DROP-HOLD switch on the special weapon secondary release panel to DROP, and then cycling the JETTISON switch from JETTISON to off and then back to JETTISON. This will reinitiate the jettison cycle in the programmer module and activate the secondary release assembly (explosive cartridges) to release the stores from the rack. If the racks are locked and the DROP-HOLD switch on the special weapon secondary release panel is set to the DROP position and the JETTISON switch on the pilot armament control panel is actuated, the TACCO is cued by the UNLOCK lights on the bomb bay rack lock control panel and by the UNLOCK light on the secondary rack lock panel to unlock the racks; however, the racks can be unlocked only by the UNLOCK buttons on the secondary rack lock panel.

HARPOON MISSILE SYSTEM.*

The harpoon missile is an all weather, low altitude, antiship cruise missile designed for launch from the P3-C. The harpoon missile incorporates low-level cruise trajectory, over-the-horizon range, active guidance, counter-countermeasures capability, and a contact-detonated high explosive blast warhead.

The aircraft can accomodate as many as six operational harpoon missiles which can be fired singly or in pairs.

The harpoon aircraft command launch control set (HACLCS) interfaces with the armament system for weapon control and release functions. Weapon inventory is maintained by the ASQ-114 computer via logic unit 2.

SYSTEM COMPONENTS.

The HACLCS system consists of the following components:

QTY	NOMENCLATURE	LOCATION
1	Missile Control Panel C-9574/AWG-19(V)	TACCO station
1	Data Processor Computer CP-1138(V)1/UYK	Electronic rack B2
1	Control Distribution Box C-9081/AWG-19(V)	SS-2
1	Decoder/Encoder KY-812/AWG-19(V)	TACCO station
1	Interconnection Box J-3390/AWG-19(V)	Electronic rack D3

Missile Control Panel.

The missile control panel located at the TACCO station provides power application and controls and displays for the harpoon missile. The controls are used manually defining missile selection/deselection, warhead fuzing, target range and relative bearing, attack and seeker modes, and aircraft true speed and altitude inputs. Status displays for each operational harpoon on the aircraft are provided as well as a light emitting diode (LED) display on the range and relative bearing. Figure 8-26 shows the missile control panel and its functions.

Data Processor Computer.

The data processor computer (DPC) (figure FO-17) is a general purpose, stored program, digital computer that provides the digital communications link between the HACLCS and the missile. The DPC serves as an interface unit to obtain control and data information from existing aircraft systems. The DPC performs the launch interlocks and prelaunch computations for missile initialization and control of the launch sequence.

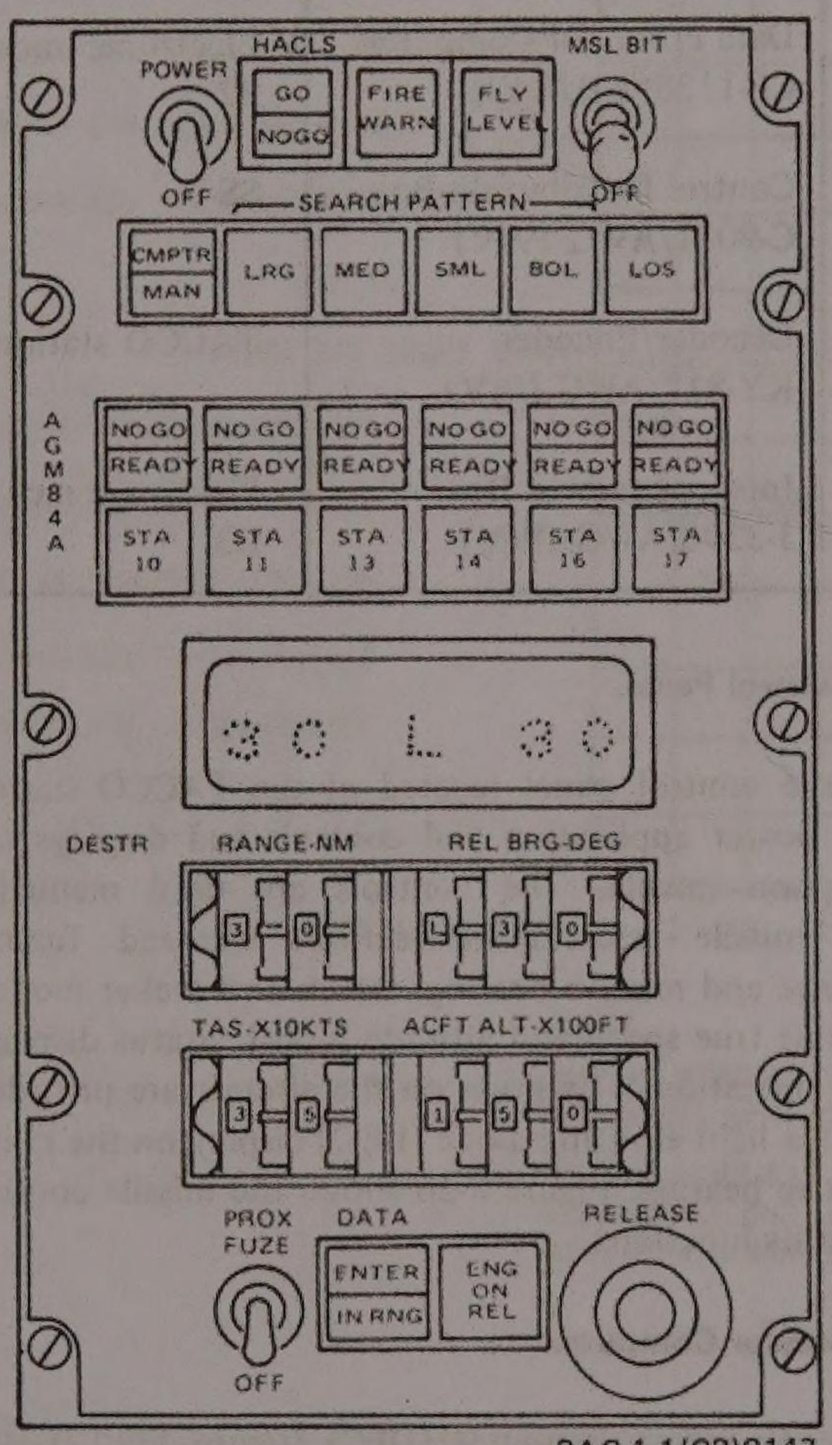
When the HACLCS is being operated in the manual mode, the DPC synchro-to-digital converter receives direct inputs of aircraft pitch, roll, and heading from the navigation system. The DPC receives inputs from the missile control panel via the decoder-encoder.

Control Distribution Box.

The control distribution box (figure FO-17) supplements existing aircraft systems with missile control and release capability and provides the missile initialization commands

* Aircraft BUNO 159889, 160290 and subsequent and prior aircraft incorporating AFC 405.

C-9574/AWG-19(V) MISSILE CONTROL PANEL



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PANEL MARKING	EQUIPMENT FUNCTION
POWER switch	Applies power to HACLCS and initiates HACLCS BIT. In OFF removes power and resets latching relays
HACLS	
GO light	Indicates successful completion of HACLCS BIT
NO GO light	Indicates HACLCS BIT or reset failure
FIRE WARN light	Indicates a fire in the missile sustainer section.
FLY LEVEL light	Indicates level flight required or in effect
MSL BIT switch	Initiates missile BIT at a selected station

PANEL MARKING	EQUIPMENT FUNCTION
SEARCH PATTERN switchlights	
LRG	Enables missile seeker large search pattern
MED	Enables missile seeker medium search pattern
SML	Enables missile seeker small search pattern
BOL	Enables missile seeker bearing only launch search pattern and the DESTR annunciator
LOS	Enables line of sight mode.
STA	
NO GO lights	Red continuously when selected missile is determined bad by missile BIT check Flashing station NO GO light will show location of fire
READY lights	Indicates green when the missile at the selected station is ready for release
STA switchlights	Select and deselect missile stations
Range and Bearing Real Time Readout LEDs.	Display target range and relative bearing data used by the DPC for calculating missile targeting data
REL BRG-DEG thumbwheels	Permit relative bearing - degree data entry into the DPC
ACFT ALT-X 100 FT thumbwheels	Permit aircraft altitude - times 100 feet data entry into the DPC
RELEASE switch	Initiates the missile launch sequence
ENG ON REL switchlight	Selcts/deselects or advises of engine on release
DATA	
ENTER switchlight	Pressing enters thumbwheel data into DPC
IN RNG light	Indicates aircraft within target range
PROX FUZE switch	Selects proximity fuze (Exercise missiles only)
OFF	Normal state of switch
TAS - X 10 KTS thumbwheels	Permits true airspeed - times 10 knots data entry into the DPC
RANGE-NM thumbwheels	Permits range in nautical miles data entry into the DPC
DESTR annunciator light	Cues TACCO to enter range for missile destruct (130L mode only)
CMPTR/MAN switchlight	Selects manual mode. Computer mode not available

NEW

Figure 8-26. Missile Control Panel C-9574/AWG-19(V)

and controls. It also provides the switching, sequencing, and interlock functions required to select, prepare, and launch missiles singly or in pairs (one port and one starboard).

Decoder-Encoder.

The decoder-encoder (figure FO-17) is an input/output device that performs the decoding, encoding, sequencing, and transfer of all HACLCS operating data. It provides binary-coded decimal inputs and outputs for manual target data insertion and display via the missile control panel.

Interconnection Box.

The interconnection box (figure FO-17) contains and routes the wiring between the HACLCS and the aircraft wiring.

Missile Built-in-Test (MSL BIT).

A missile BIT check should be performed on loaded missiles prior to launch. Figure 8-28 shows the missile BIT check procedure.

MODES OF OPERATION.

The HACLCS has three modes of operation:

- Manual
- Manual fly level
- Line-of-sight

Manual.

The manual mode is the primary mode of operation. The TACCO controls the prelaunch sequence, which includes applying aircraft power to the missile and selecting missile seeker modes range and bearing launch (R/BL) with three selectable search pattern sizes or bearing only launch (BOL). It also provides targeting, alignment, and reference data, and monitors the HACLCS and missile status using the missile control panel. The pilot maintains command control over the launch through the MASTER ARM switch on the pilot armament control panel.

Upon missile selection, R MSL SEL or L MSL SEL light on the pilot instrument panel glareshield lights. When prelaunch preparation is complete and the missile is ready to launch, the KILL READY light on the pilot armament control panel, and READY light on the missile control panel come on. The TACCO, pilot, and copilot have the capability of initiating missile launch. The TACCO can press RELEASE on the missile control panel, and the pilot or copilot can press STORES REL on their control wheels. The TACCO, pilot, and copilot missile select indicators extinguish when one of the following occurs:

- The missile has been released.
- The TACCO has deselected the missile.
- The missile launch has been aborted.

In case of a missile overheat, the FIRE WARN light and the NO GO light at the affected station on the missile control panel, figure 8-26, and the MSL FIRE light on the pilot and copilot glareshields, figure FO-17, will illuminate. The pilot or TACCO will release the appropriate missile. See Harpoon Overheat Release Procedure, figure 8-27.

HARPOON OVERHEAT RELEASE PROCEDURE

OPERATOR	CONTROL PANEL	OPERATOR ACTION
Pilot	ACP	MASTER ARM to ON
TACCO	MANUAL ARM SEL	STATION SELECT WING to desired station
		ARMING RKT/ FLARE to SAFE
		REL MODE FLARE to RACK REL
		STATION SELECT BOMB BAY to OFF
Note		
The KILL READY light on the ACP and KILL RDY light on the MANUAL ARM SEL panels illuminate.		
Pilot	Control wheel	Press STORES REL to release harpoon
TACCO	MANUAL ARM SEL	Press BOMB-TORP REL to release harpoon

Figure 8-27. Harpoon Overheat Release Procedure

NEW The procedure for manual mode launch is shown in figure 8-29.

Note

NEW NEW When in manual mode the 26 Vac MAD circuit breaker on the forward nav interconnection box must be set to enable synchro-to-digital conversion of navigational pitch, roll, and heading inputs by the data processor computer.

Manual Fly Level.

The manual fly level mode is used when aircraft attitude data is unavailable to the DPC. In this mode the aircraft is required to fly level for 40 seconds before launch.

NEW The procedure for manual fly level mode launch is shown in figure 8-30.

Line-of-Sight.

The line-of-sight (LOS) mode is used when the DPC or the decoder-encoder is inoperative. The aircraft must fly level for 40 seconds before launch in this mode.

NEW The procedure for line-of-sight (LOS) mode launch is shown in figure 8-31.

NEW HARPOON IN-FLIGHT MISSILE SIMULATOR (If installed).

The harpoon in-flight missile simulator (HMS) permits the TACCO to perform all select, target, and launch functions for a designated wing station. The HMS can manually insert abnormal missile conditions, digital faults, initialization failure, fire, and abort. Figure 8-32 shows the HMS and its functions.

WARNING

In order to prevent inadvertent wing station weapon release, the harpoon missile simulator shall be disconnected during all wing station weapons loading and transporting operations.

ORDNANCE SYSTEM.

The ordnance (search stores) subsystem is one of the two subsystems that make up the aircraft arm/ord system. The ordnance system includes the equipment used for carrying and delivering search stores, that is, the sonobuoys, bathythermographs, smoke markers, and so forth (see figure 8-33).

The search stores system provides the control and circuitry for the control and release of the search stores. Normal automatic control is provided by the computer via the data processing system. Backup manual control is provided by the search stores manual control panel which allows the ordnanceman to release search stores in the manual (off-line) mode. The pilot exercises final control over a search store release as he must operate the search store power switch to ON before any search store can be released from the aircraft in either the automatic or manual mode.

The computer is programmed for the proper control and release of the store loaded in each launcher. Also, the computer maintains an inventory of the stores in the launchers and in the stowage bins. The inventory can be displayed on the TACCO auxiliary readout upon request from his keyset.

The sonobuoy system comprises the storage, control and dispensing facilities for 84 A-size sonobuoys, each prepackaged in a launch container having an envelope 5.4 inches in diameter and 41.6 inches long.

Stowage for 36 sonobuoys in containers is provided in the cabin, and for 48 loaded in fixed, unpressurized launchers under the cabin floor. The fixed launchers are loaded and unloaded from outside the aircraft. Three pressurized A-size launchers are located in the cabin. An electric circuit is provided in the breech at the sonobuoy launcher for actuation of the cartridge which ejects the sonobuoy. Computer control of the sonobuoy system is addressable from the TACCO tray.

MODES OF OPERATION.

The primary mode of operation of the ordnance system is the automatic (on-line) mode utilizing the computer, data processing system (DPS), pilot keyset, TACCO keyset, multipurpose display (MDD), ordnance alert lights, and the ordnance panel to control and monitor the system. The manual (off-line) mode is used primarily to test ordnance system functions and may be used to manually select and release sonobuoys from the SLTs.

Automatic Mode.

The automatic mode provides a method of search store management which allows maximum flexibility and control of the ordnance system while minimizing the amount of necessary manual action required by the tactical crew. In the automatic mode, the search store system is designed to

HARPOON MISSILE BIT CHECK

Step	Operator	Panel	Action	Indication
1.	ORD	Harpoon circuit breaker panel	Circuit breakers in	
2.	TACCO	MCP	POWER switch on	
3.	TACCO	MCP	If LOS amber, press LOS switch	LOS light green
4.	TACCO	MCP	CMPTR/MAN switch to MAN	MAN light amber
5.	TACCO	MCP	Select LRG search pattern	LRG light amber
6.	TACCO	MCP	MSL BIT switch up and hold	
7.	TACCO	MCP	Select loaded station to be checked	
8.	TACCO	MCP	MSL BIT switch released	
		Note		
		Indications received during BIT check: Station selected on, NO GO light red for 15 seconds, then NO GO light off are normal indications. Steps 10 and 11 are completed after missile BIT check is performed on all loaded stations.		
9.	TACCO	MCP	Deselect loaded station	
10.	TACCO	MCP	POWER switch to OFF	
11.	ORD	Harpoon circuit breaker panel	As required	
		FIRE DETECTOR TEST		
		Note		
		Steps 1 and 2 are completed after missile BIT check is performed on all loaded stations.		
1.	ORD	Harpoon circuit breaker panel	FIRE DET circuit breakers in	
2.	TACCO	MCP	Press FIRE WARN switch	FIRE WARN light red. Station loaded NO GO light flashes. Pilot/copilot glare-shield MSL FIRE light on

Figure 8-28. Harpoon Missile BIT Check

NEW NEW NEW

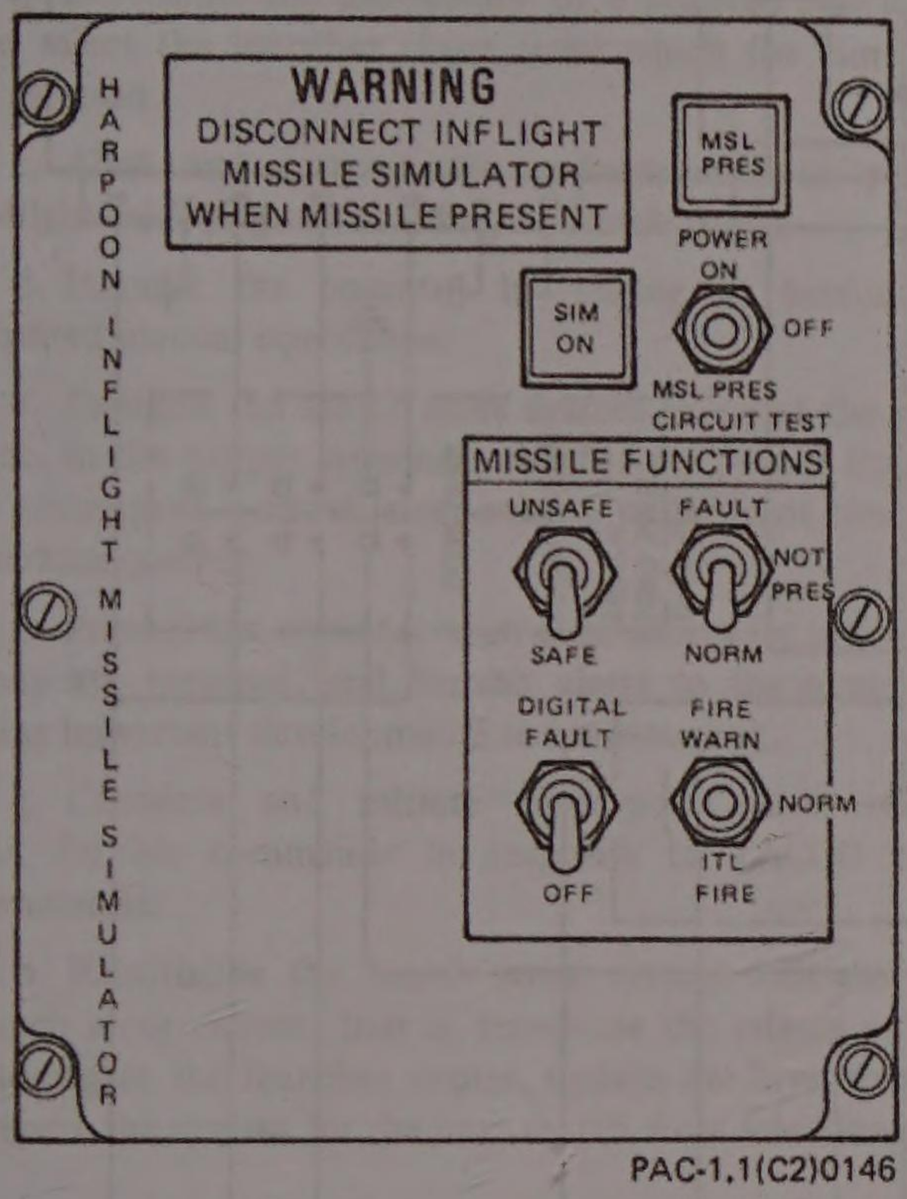
HARPOON MANUAL FLY LEVEL MODE LAUNCH

Step	Operator	Panel	Action	Indication
		Note The manual fly level mode is used when aircraft attitude data is not available to the DPC.		
1.	ORD	Harpoon circuit breaker panel	Circuit breakers in	
2.	TACCO	MCP	POWER switch on	
3.	TACCO	MCP	If LOS amber, press LOS switch	LOS light green, FLY LEVEL light red
4.	TACCO	MCP	CMPTR/MAN switch to MAN	MAN light amber
5.	TACCO	MCP	Select desired search pattern	Search pattern selected lights amber
6.	TACCO	MCP	Press FLY LEVEL	FLY LEVEL light amber
7.	TACCO	MCP	Select desired launch station(s)	Station(s) selected light amber. NO GO light(s) red for 7 to 10 seconds
8.	Pilot		Fly aircraft wings level for 40 seconds before launch	
9.	TACCO	MCP	Set RANGE-NM, REL BRG-DEG, TAS x 10 KTS, and ACFT ALT x 100 FT thumbwheels	
10.	Pilot	ACP	MASTER ARM switch ON	
11.	TACCO	MCP	Press DATA ENTER	ENTER light goes off, IN RNG light green, station(s) selected light(s) green. ENG ON REL may be amber or out
12.	Pilot/ Copilot TACCO	Control Wheel MCP	Press STORES REL Press RELEASE	Station(s) selected READY light goes off then flashes on. When missile is away, station select lights off; READY lights off

Figure 8-30. Harpoon Manual Fly Level Mode Launch

NEW NEW NEW

HARPOON MISSILE SIMULATOR



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PANEL MARKING	EQUIPMENT FUNCTION
MSL PRES light	Indicates a missile is present at the station where the simulator is connected
POWER switch	
ON	Applies power to simulator
OFF	Removes power
MSL PRES CIRCUIT TEST	Initiates a test to check for a missile present

PANEL MARKING	EQUIPMENT FUNCTION
MISSILE FUNCTIONS switch	
FAULT	Simulates a fault in the missile
NOT PRES	Simulates a missile not present
NORM	Normal position – no faults simulated
MISSILE FUNCTIONS switch	
FIRE WARN	Simulates a fire in missile
NORM	Normal position – no fires simulated
ITL FIRE	Simulates a fire during Intent To Launch
MISSILE FUNCTIONS switch	
DIGITAL FAULT	Simulates a digital fault in the missile
OFF	Normal position – no faults simulated
MISSILE FUNCTIONS switch	
UNSAFE	Simulates an unsafe missile inhibiting missile selection
SAFE	Normal position – no faults simulated
SIM ON light	Indicates simulator power is on

Figure 8-32. Harpoon Missile Simulator

SEARCH STORES SIMPLIFIED DIAGRAM

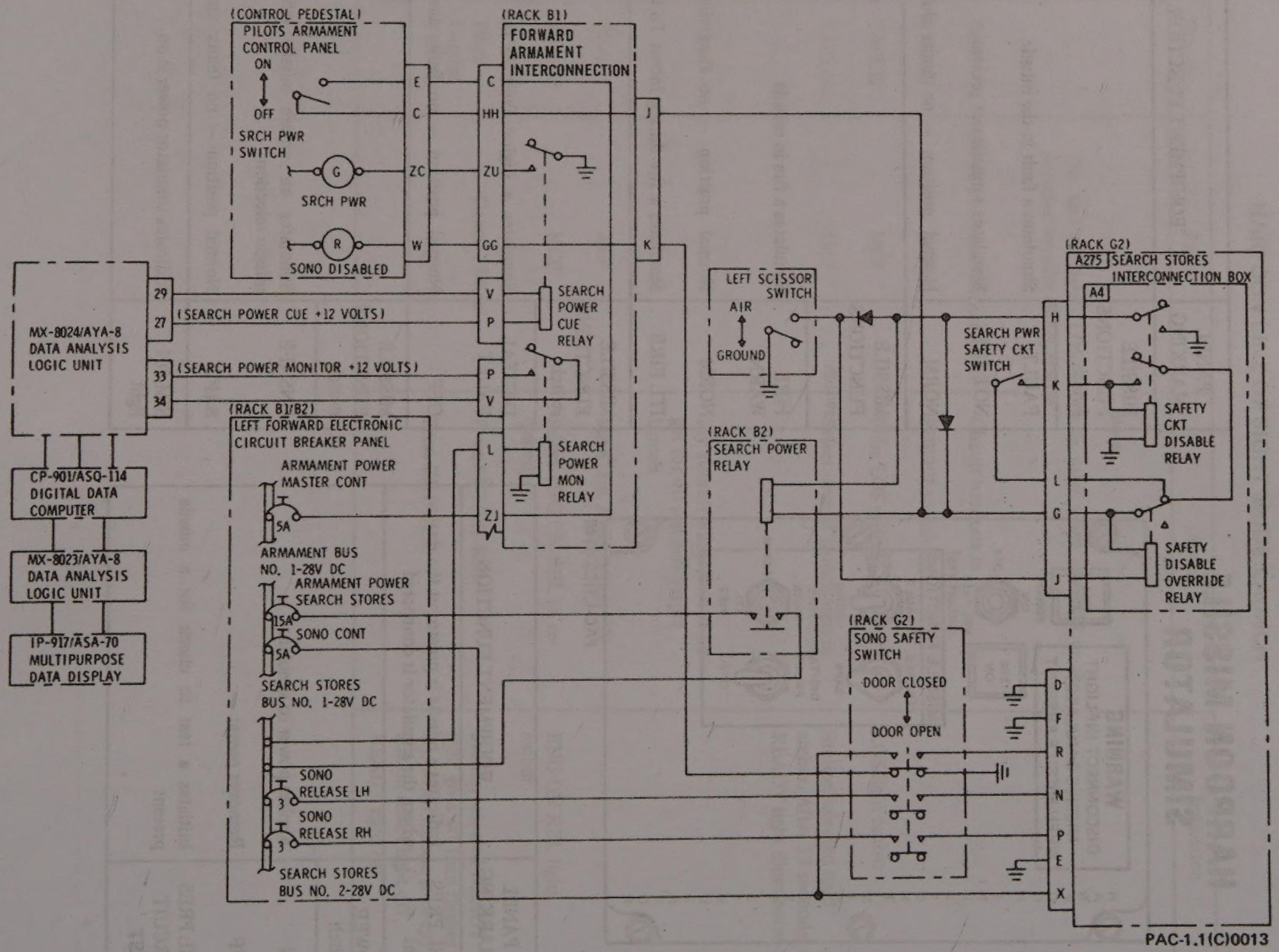

Figure 8-33. Search Stores Simplified Diagram

have the computer and its peripheral equipment perform the following functions:

a. Maintain an up-to-date inventory of search stores and provide the means for displaying the inventory on the TACCO ARO.

b. Determine the availability of a selected search store and select the launcher chute from which the store is to be released.

c. Alert and instruct the ordnanceman to perform in-flight reloading or unloading of search stores.

d. Instruct the operator by cueing to perform the required manual operations.

e. Energize the search store system relays at the proper time, in the proper sequence, and for the proper duration, to accomplish a search store release under joint computer-operator control.

f. Present the operator with alternatives for which decisions are required, and furnish alerts to the operator to bring important developments to his attention.

g. Calculate and initiate fly-to-point store releases, and furnish commands in response to TACCO release commands.

h. Reinitialize the search store system following each search store release; that is, terminate the release outputs, interrogate the launcher chutes, update the inventory, and prepare the system for the next search store selection.

Manual Mode.

Search store release and control in the manual mode is accomplished using the manual launcher select panel controls located on the A275 search stores interconnection box (figure 8-34). The desired sonobuoy launch tube is selected using the letter and number LAUNCHER SELECT rotary switches. When the SLT has been selected and the SRCH PWR switch on the pilot armament control panel is ON, a launch is accomplished by actuating the SONO LAUNCH switch located on the manual launcher select panel. The manual mode is also used to check continuity to sonobuoys loaded in the SLTs or to check for lack of continuity which indicates that a sonobuoy is not in the selected SLT or that a wiring defect exists.

SEARCH STORES MANUAL CONTROL.

The search stores manual controls are located on the manual launcher select panel A275 in rack G2. The panel contains controls to interrogate or to manually select and launch any of the sonobuoys, and a press-to-test type CONTINUITY CHECK light. Switch and light functions are described as follows (see figure 8-34):

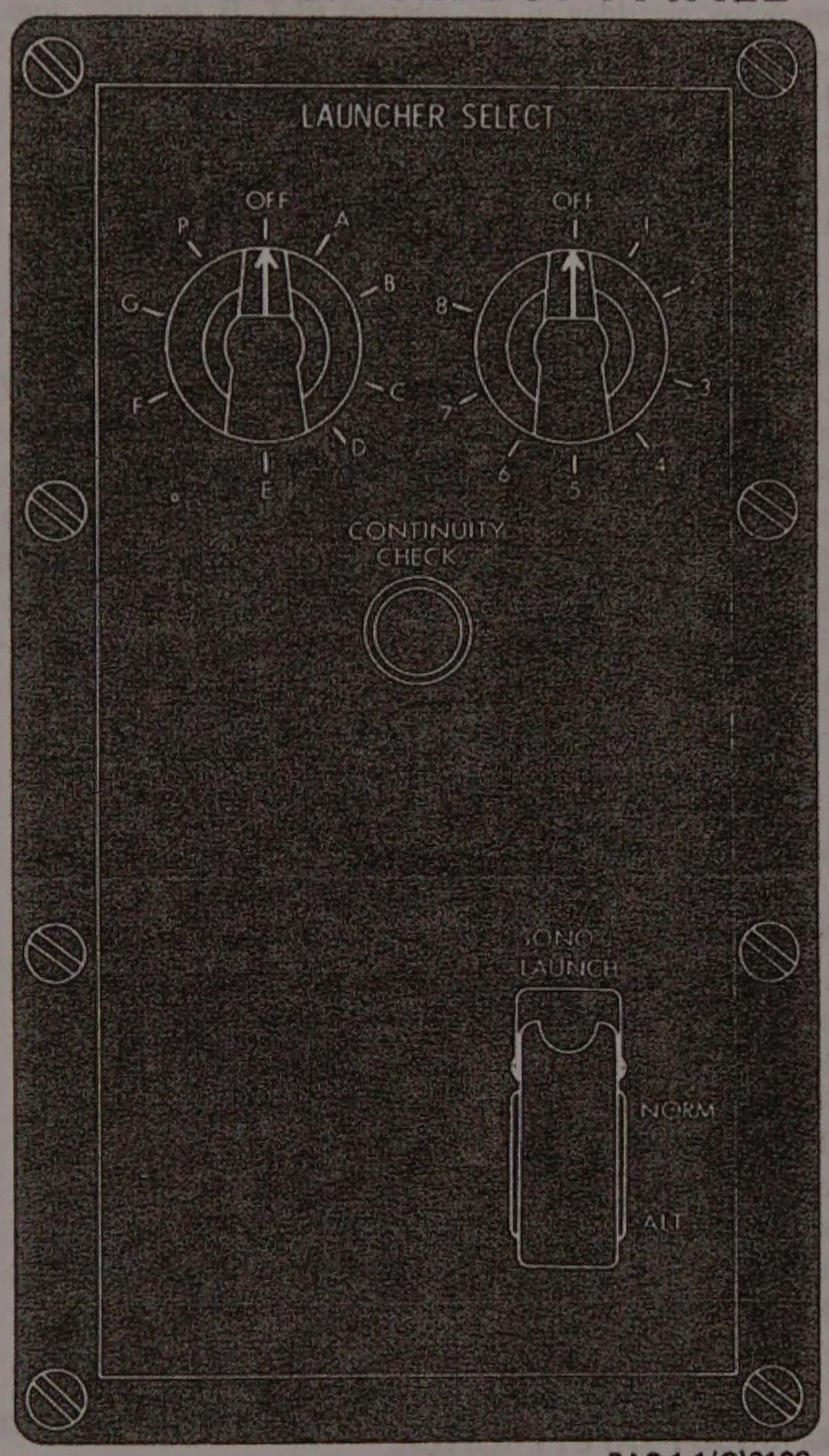

Figure 8-34. Manual Launcher Select Panel

a. LAUNCHER SELECT switches–Two LAUNCHER SELECT switches provide switching capability to select any one of the 51 SLTs. The OFF position is the normal position for the two rotary selector switches when operating the search store system in the automatic (on-line) mode. For manual selection, for either launch or test functions, the switches are positioned to the letter/number combination for the desired launch tube. The positions on one switch are identified by the letters A through G and P; the positions on the second switch are identified by the numbers 1 through 8.

b. CONTINUITY CHECK light–A press-to-test light is located in the center of the panel to indicate continuity between the LAUNCHER SELECT switches and the sonobuoy cartridge in the selected SLT. If the light does not come on when a manual selection is made, it indicates that an open circuit exists in the wiring. A momentary light indication when an empty SLT is selected is normal; the light remains on when continuity exists through the test fixture or through an installed sonobuoy cartridge.

c. SONO LAUNCH switch–This guarded switch, when actuated, provides the launch current to the selected sonobuoy cartridge. The switch is a three-position, center-off switch with the upper and lower switch positions labeled NORM and ALT. Actuating the switch to the NORM position directs firing current from the normal launch driver circuit to the selected sonobuoy cartridge; actuating the switch to the ALT position directs firing current from the alternative launch driver circuit to the selected sonobuoy cartridge.

SEARCH POWER SAFETY CIRCUIT DISABLE SWITCH.

This switch is labeled SEARCH PWR SAFETY CKT and is located in rack G2. The switch is used to override the sonobuoy release safety circuits that exist when the aircraft weight is on the gear (scissor switch in ground position). For ground tests of the sonobuoy release circuits, the SEARCH PWR SAFETY CKT switch must be momentarily actuated to the DISABLE position with the SRCH PWR switch on the pilot armament control panel in the ON position and the SONOBUOY SAFETY SWITCH ACCESS DOOR closed.

SONOBUOY SAFETY SWITCH.

The SONOBUOY SAFETY SWITCH is located in the lower fuselage just forward of the sonobuoy launch tube openings. The switch is only accessible from the outside of the aircraft by opening an access door, labled SONOBUOY SAFETY SWITCH ACCESS DOOR, in the lower fuselage skin. The switch is spring-loaded to the safe position when the door is open to interrupt the launching circuits and prevent the possibility of an inadvertent sonobuoy launch during ground loading or maintenance. Closing the door presses the switch plunger, positioning the switch so that the sonobuoy release circuits are closed, and also turns out the SONO DISABLED light on the pilot armament control panel. A small spring-loaded stop is attached to the inside of the door so that the door must be purposely closed and cannot be accidentally pushed closed.

SONOBUOY REFERENCE SYSTEM (SRS).

The sonobuoy reference system, ARS-3, is an airborne subsystem that provides phase measurement data to the ASQ-114(V) digital computer set which determines the position of selected deployed sonobuoys in relation to the aircraft. The system interfaces with the ASQ-114(V) through the data multiplexing subunit of logic unit 4. The SRS operates passively, receiving sonobuoy transmission via ten blade antennas installed on the aircraft exterior surfaces (see figure 7-1).

The SRS installed P-3C aircraft provides angle measuring equipment (AME) operation only; distance measuring equipment is not installed (provisions only). Operations require line-of-sight conditions and can be utilized to update sonobuoy directional positions without flying to the sonobuoy. The only ARS-3 operating control is a combined circuit breaker and ON/OFF switch on the face of the receiver-converter (figure 8-35) located in the electronics rack E1 or above the HF-2 coupler. The switch must be positioned to the ON position for the equipment to be energized. Built-in test (BITE) is provided to obtain a go/no-go input to the computer and to isolate antenna or receiver-converter faults. Two test-point selector switches, located on the front panel of the receiver-converter, can be used for troubleshooting. (The position of selector switches does not affect SRS operation.) In addition, an elapsed time meter on the front panel indicates cumulative operating time. Primary power for the equipment is provided through main ac bus A three-phase circuit breakers located on the main load center electronic panel.

SRS PROCESSING.

Signals from selected deployed sonobuoys are received via SRS receiver-antennas and fed to the ARS-3 receiver-converter. The receiver-converter selects an antenna-pair, measures the difference in phase of the signals received on that pair and sends the results to the ASQ-114(V) computer. The system operates on any one of 31 different frequency channels selected by the computer. All operations are performed under control of the computer in response to manual input commands initiated by the operator.

The SRS subprogram stores several bearings from a sonobuoy and computes the intersection as a fix. The process commences whenever SRS is activated and continues to automatically update each sonobuoy position until the function is deactivated. As a result, the sonobuoy's real position is continuously plotted as it drifts on the ocean surface.

SONOBUOY REFERENCE SYSTEM - R-1997/ARS-3 RECEIVER-CONVERTER

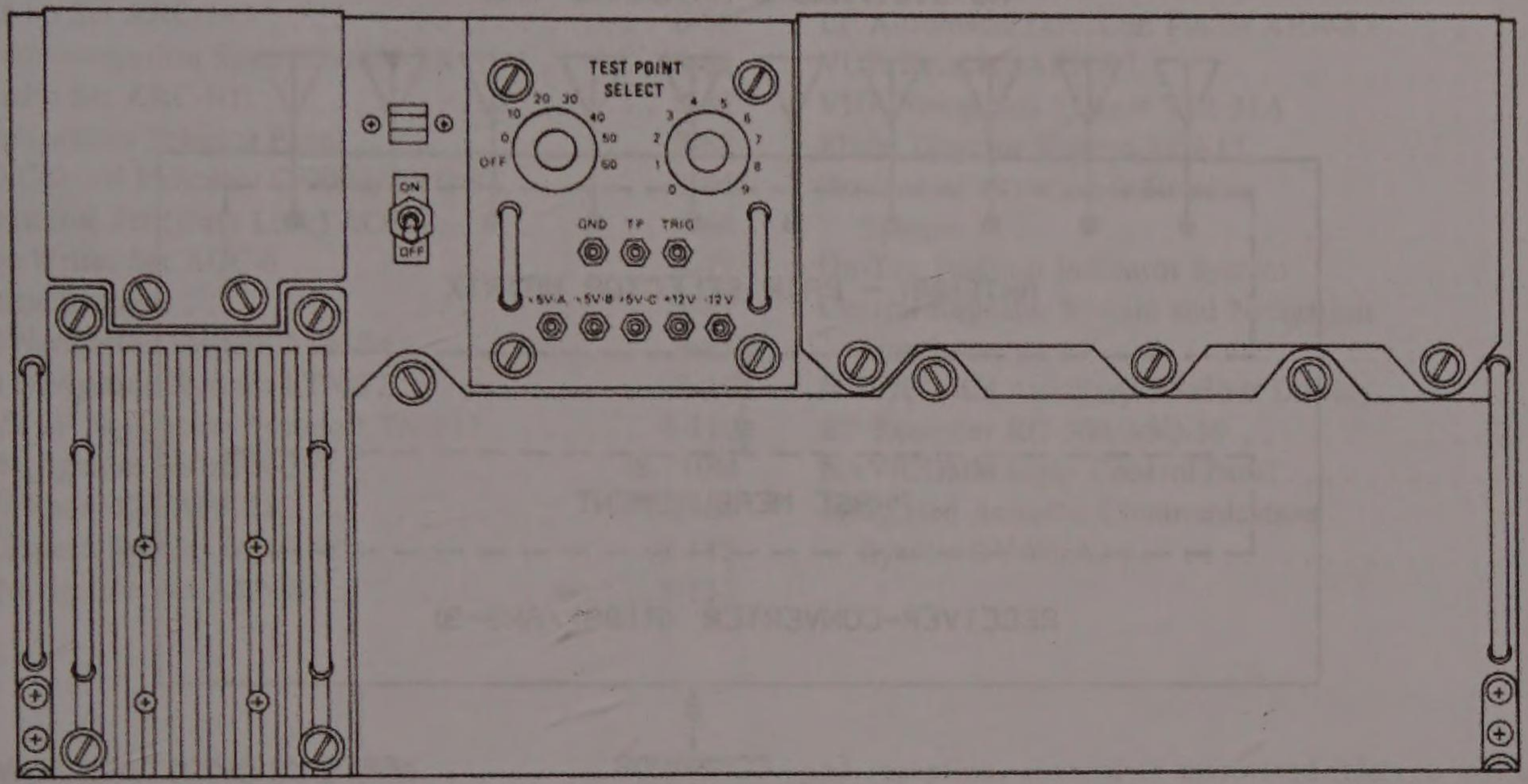

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Figure 8-35. Sonobuoy Reference System—Receiver-Converter R-1997/ARS-3

Note

Sonobuoy position is relative to the aircraft; therefore, excessive sonobuoy position errors may occur if the aircraft navigation system is drifting at a high rate.

SRS ANTENNAS.

The ten SRS antennas are precisely spaced when installed. The antenna spacings have been chosen to provide data which can be combined to provide unambiguous direction measurement. Each of the antennas is connected to a selector matrix in the receiver-converter (see figure 8-36) where, through switching diodes, each pair of antennas is connected automatically in sequence, to the receiver. In addition, calibration signals are periodically sent from the ARS-3 receiver-converter to each antenna to measure the system phase-shift. This eliminates errors that could be caused if the electrical characteristics of the receiver system experience slight changes over a period of time.

SRS INTERFACE BLOCK DIAGRAM

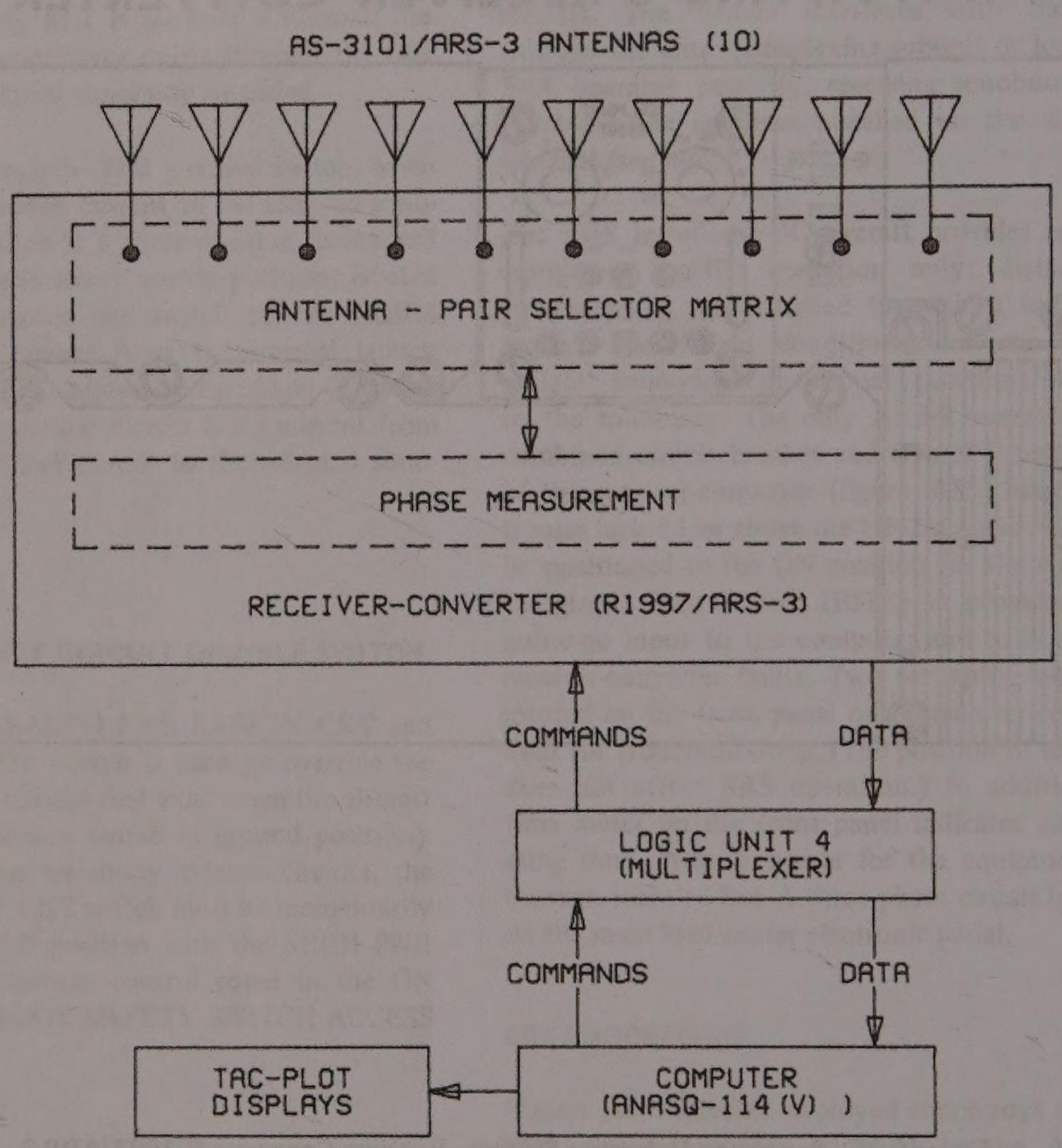

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Figure 8-36. SRS Interface Block Diagram

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UHF Direction Finder ARA-50	8-120
LF Automatic Direction Finder ARN-83	8-120
VOR Receiver ARN-87	8-121
VHF Navigation System VIR-31A	8-121
Flight Director System AJN-15	8-121
Horizontal Situation Indication System	8-128
On-Top Position Indicator System	8-130
Central Repeater System and Navigation Simulator	8-130
NAV/COMM Auxiliary Readout Display	8-137
BT Recorder RO-308/SSQ-36	8-137
NAV/COMM Light Control Panel	8-139
Integrated Acoustic Communication System OV-78/A	8-140

COMMUNICATIONS SYSTEM.

The communications system provides for the transmission, reception, and processing of a variety of intelligence and tactical data, both internally and externally to the aircraft. See figure FO-2 for a block diagram of the communications system. Because of the multiplicity of equipment, frequency channels, and using stations, communications are evaluated and provide a degree of priority control. Also, because of the numbers of channels, equipment, and operators, the availability for use of equipment becomes complex. In general, the aircraft communications system consists of an intercommunication system and five radio communication functions performed by five radio sets with their associated control panels. The functions are plain voice, cipher (coded, secure) voice, teletype, data link (to computer and data processing systems), and sonobuoy command. The radio sets are as follows:

a. A VHF radio set is used for plain voice only, controlled from the flight station.

b. One UHF radio set, controlled from the flight station, is capable of plain voice transmission and reception, cipher voice transmission and reception, and automatic direction finding operation.

c. Another UHF radio set, controlled from the navigator/communicator (NAV/COMM) station, is capable of plain voice transmission and reception, cipher voice transmission and reception, covered or uncovered teletype transmission and reception, ciphered or plain data link transmission and reception, and sonobuoy command data.

d. Two HF radio sets, controlled from the NAV/COMM station, are used for voice transmission and reception, data link, and teletype functions, each plain or cipher.

e. A VHF communication system which provides two-way voice communications over the 116.000 to 151.975 MHz frequency range.*

The P-3C communications system comprises the following equipment, each (with operating procedures) described individually in the following paragraphs:

Intercommunications System	AIC-22
HF-1, HF-2 Transmitter-Receiver	ARC-161
UHF-1, UHF-2 Transmitter-Receiver and Security Unit	ARC-143 and KY-28
*VHF Communication System	618M-3A
VHF Transmitter-Receiver	ARC-101
Data Terminal Set (Data Link) and Security Unit	ACQ-5 and KG-40
TTY Set and Security Unit	AGC-6 and KW-7CR
SETAD System and Security Unit	UYQ-8 and KG-35
Integrated Acoustic Communications System	OV-78/A

*Aircraft BUNO 161122. 161132 and subsequent.

Prime control of the system is by a communications selector panel in the NAV/COMM station, and a UHF-1 voice selector panel in the flight station, plus the ICS master control panels and associated switching matrixes. Function selectors have self-illuminated pushbutton-indicators for selecting the communication function. Availability of a function is indicated by green illumination of the pushbutton legend. Selection of an available function causes the pushbutton color to change to amber. This selection will also be indicated, where appropriate, by pushbutton-indicators lighting on the ICS master control panels and the monitor control panel of the data terminal set.

This lighting is interlocked with the communications equipment input power, and in the case of the ICS master control panels and DTS monitor control panel, with the function selectors of the communication selector and the UHF-1 voice selector panel.

A typical NAV/COMM station arrangement is shown in figure 8-37.

NEW Communications system panel selector cueing is shown in figure 8-38.

ICS MASTER CONTROL PANEL AIC-22.

An ICS master control panel (figure 1-44) is installed at the pilot, copilot, tactical coordinator, and NAV/COMM stations. Each control panel contains 24 lighted pushbutton-indicators and two volume control knobs. See Section I, Part 2 for detailed information pertaining to the identification and function of each control. Positive 28 volts direct current from the essential dc bus on the forward load center circuit breaker panel is supplied to the unit through an internal 1.5-ampere fuse and direct current filter network. The ICS master control panels are internally identical and differ only in the connected lines and front plastic panel.

HF RADIO SET ARC-161.

The high-frequency radio, ARC-161, is a two-way transmitter/receiver, operating in the frequency range of 2 to 29.9999 MHz. There are two sets in the aircraft, denoted HF-1 and HF-2, and controlled from the NAV/COMM station. The sets are entirely separate from input to antenna. Each set provides 280,000 channels, with 100-Hz channel separation. The equipment single sideband operating modes are upper sideband (USB), USB-LSB, amplitude modulated equivalent (AME), and diversity (DIV). In the USB mode the receiver processes RF carriers modulated by Link 11 data, plain voice, teletype and SETAD data.

An antenna coupler, CU-2070/ARC, is used between the transmitter and antenna to provide a correct impedance match. During transmission, the coupler automatically tunes to the antenna impedance, enabling the transmitter to deliver full power (1 kilowatt) to the antenna. Two long-wire antennas, one for each T/R, are located on the top side of the fuselage. (See figure 7-1.) Three-phase ac power is supplied to the HF-1 radio set from the monitorable essential ac bus–electronics, on the forward electronics circuit breaker panel, and dc power is from the monitorable essential bus No. 2 on the forward electronics circuit breaker panel. Three-phase ac power is supplied to the HF-2 radio set from the main ac bus A in the main load center, and dc power is supplied by the main dc bus, also in the main load center.

NEW

Each HF radio set is controlled primarily by a separate radio set control panel, and secondarily by the communications selector panel. Description of the radio set panel follows.

HF RADIO CONTROL PANEL.

Two identical HF radio set control panels (figure 8-39) are located in the upper left portion of the instrument panel in the NAV/COMM station. The panels are functionally independent and permit the navigator/communications operator to have complete control over the transmitter/receivers.

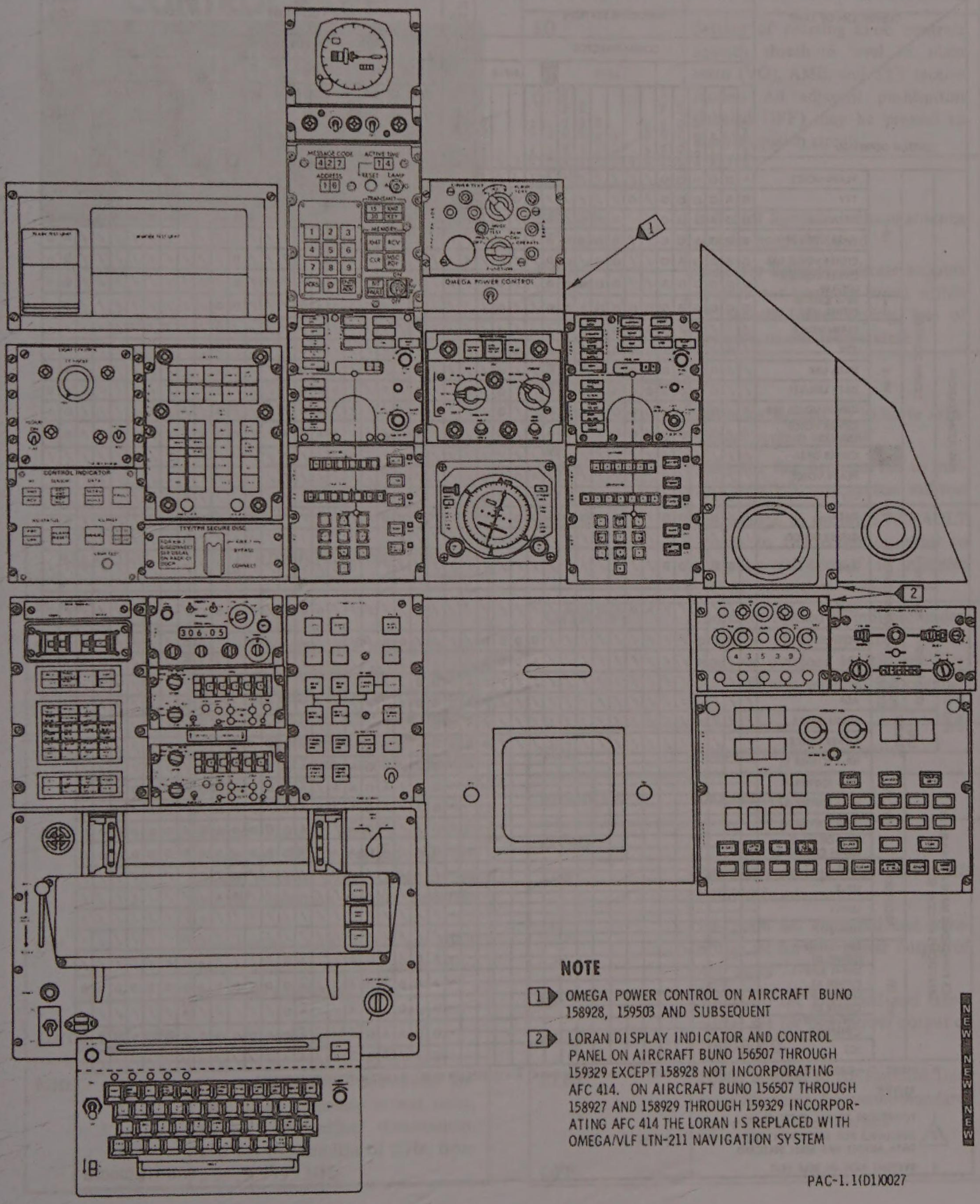
Note

See Section I, Part 2, for ICS description and NAV/COMM relationship with other stations and equipment.

UHF RADIO SET ARC-143.

The UHF radio equipment consists of two identical receiver-transmitter, ARC-143, three antennas, and two UHF radio set control panels. The two radio sets, denoted UHF-1 and UHF-2, are located in electronics rack F1, with controls located in the flight station and NAV/COMM station. The UHF-1 set, controlled by the pilot, is normally used for air-to-ground and plane-to-plane communication (in plain or cipher voice) and automatic direction finding in conjunction with the ARA-25 or ARA-50 equipment. The UHF-2 set, controlled by the NAV/COMM officer, also is normally used for voice communication same as the UHF-1 set, but is usable also with data link, teletype, and sonobuoy command functions. The three antennas consist

NAV/COMM STATION ARRANGEMENT (TYPICAL)



NOTE

1 OMEGA POWER CONTROL ON AIRCRAFT BUNO 158928, 159503 AND SUBSEQUENT

2 LORAN DISPLAY INDICATOR AND CONTROL PANEL ON AIRCRAFT BUNO 156507 THROUGH 159329 EXCEPT 158928 NOT INCORPORATING AFC 414. ON AIRCRAFT BUNO 156507 THROUGH 158927 AND 158929 THROUGH 159329 INCORPORATING AFC 414 THE LORAN IS REPLACED WITH OMEGA/VLF LTN-211 NAVIGATION SYSTEM

NEW NEW NEW

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Figure 8-37. NAV/COMM Station Arrangement

COMMUNICATIONS SYSTEM PANEL SELECTOR CUEING

CONDITION OF LAMP / SWITCH DEPRESSED			NAV/COM STATION														FL STA	PILOT - CO-PILOT - TACO - NAV/COM																						NAV/COM
			COMM SELECTOR														UHF-1 SEL	MASTER CONTROL BOX																						DTS
			HF-1						HF-2							UHF-2		UHF-1	MIC SELECT								ICS		RECEIVERS											DATA VOICE
			PLAIN VOICE	TTY	DATA USB	DATA USB/LSB	CIPHER VOICE USB	CIPHER VOICE USB/LSB	PLAIN VOICE	TTY	DATA USB	DATA USB/LSB	CIPHER VOICE USB	CIPHER VOICE USB/LSB	CIPHER DATA	PLAIN VOICE	TTY	DATA	CIPHER VOICE	PLAIN VOICE	CIPHER VOICE	UHF-1	UHF-1 (1) CIPHER	UHF-2 (1) CIPHER	UHF-2	UHF	HF-2	HF-2 (1) CIPHER	HF-2 (2) CIPHER	HF-1	ICS	ICS SEL BUTTONS	ICS DISC BUTTONS	HF-1	HF-2	UHF-1	UHF-2	UHF	FACAN	SCN	VOR-1	ADF	AUX	DATA	VOICE
NAV/COM STATION	COMM SELECTOR	HF-1	PLAIN VOICE	A	G	G	G	G	G	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	D	D	/	/	/	D	/	/	/	/	/	/	/	/	/
			TTY	G	A	G	G	G	G	/	G	/	/	/	/	/	G	/	/	/	/	/	/	/	/	/	/	D	D	/	/	/	D	/	/	/	/	/	/	/	/	/
			DATA USB	G	G	A	G	G	G	/	/	G	G	G	G	D	/	/	G	/	/	/	/	/	/	/	/	D	D	D	/	/	/	D	/	/	/	/	/	/	/	A	D
			DATA USB/LSB	G	G	G	A	G	G	/	/	G	G	G	G	D	/	/	G	/	/	/	/	/	/	/	/	D	D	D	/	/	/	D	/	/	/	/	/	/	/	A	D
			CIPHER VOICE USB	G	G	G	G	A	G	/	/	G	G	/	G	D	/	/	G	/	/	/	/	/	/	/	/	D	A	/	/	/	/	D	/	/	/	/	/	/	/	D	A
			CIPHER VOICE USB/LSB	G	G	G	G	G	A	/	/	G	G	G	G	D	/	/	G	/	/	/	/	/	/	/	/	D	A	/	/	/	/	D	/	/	/	/	/	/	/	D	A
		↕	HF-1 & HF-2 CIPHER VOICE USB	G	G	G	G	A	G	G	G	G	G	A	G	D	/	/	G	/	/	/	/	/	/	/	/	D	A	A	D	/	/	/	D	D	/	/	/	/	/	/	D	A
		HF-2	PLAIN VOICE	/	/	/	/	/	/	A	G	G	G	G	G	/	/	/	/	/	/	/	/	/	/	/	/	/	/	D	D	/	/	/	D	/	/	/	/	/	/	/	/	/
			TTY	/	G	/	/	/	/	G	A	G	G	G	G	/	/	G	/	/	/	/	/	/	/	/	/	/	/	D	D	/	/	/	D	/	/	/	/	/	/	/	/	/
			DATA USB	/	/	G	G	G	G	G	G	A	G	G	G	D	/	/	G	/	/	/	/	/	/	/	/	/	/	D	D	D	/	/	/	D	/	/	/	/	/	/	/	A	D
			DATA USB/LSB	/	/	G	G	G	G	G	G	G	A	G	G	D	/	/	G	/	/	/	/	/	/	/	/	/	/	D	D	D	/	/	/	D	/	/	/	/	/	/	/	A	D
			CIPHER VOICE USB	/	/	G	G	/	G	G	G	G	G	A	G	D	/	/	G	/	/	/	/	/	/	/	/	/	/	A	D	/	/	/	/	D	/	/	/	/	/	/	/	D	A
			CIPHER VOICE USB/LSB	/	/	G	G	G	G	G	G	G	G	G	A	D	/	/	G	/	/	/	/	/	/	/	/	/	/	A	D	/	/	/	/	D	/	/	/	/	/	/	/	D	A
			CIPHER DATA	/	/	/	/	/	/	/	/	/	/	/	/	(2) A	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
		UHF-2	PLAIN VOICE	/	/	/	/	/	/	/	/	/	/	/	/	A	G	G	G	/	/	/	D	D	/	/	/	/	/	/	/	/	/	/	D	/	/	/	/	/	/	/	/	/
			TTY	/	G	/	/	/	/	/	G	/	/	/	/	/	G	A	G	G	/	/	/	D	D	/	/	/	/	/	/	/	/	/	/	D	/	/	/	/	/	/	/	/	/
			DATA	/	/	G	G	G	G	/	/	G	G	G	G	D	G	G	A	G	/	/	/	D	D	/	/	/	/	/	/	/	/	/	/	D	/	/	/	/	/	/	/	A	D
			CIPHER VOICE	/	/	/	/	/	/	/	/	/	/	/	/	/	G	G	G	A	/	G	/	/	A	D	/	/	/	/	/	/	/	/	/	D	/	/	/	/	/	/	/	/	/
	HF-1	(MODE)	AME	A	D	D	D	D	D	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	D	D	/	/	/	D	/	/	/	/	/	/	/	/	/	/
	HF-2	(MODE)	AME	/	/	/	/	/	/	A	D	D	D	D	D	/	/	/	/	/	/	/	/	/	/	/	/	/	D	D	/	/	/	D	/	/	/	/	/	/	/	/	/	/
	UHF-2	(COND)	SC	/	/	/	/	/	/	/	/	/	/	/	/	D	D	D	D	/	/	/	/	D	D	/	/	/	/	/	/	/	/	/	D	/	/	/	/	/	/	/	/	/
			G	/	/	/	/	/	/	/	/	/	/	/	/	A	D	D	D	/	/	/	/	D	D	/	/	/	/	/	/	/	/	/	D	/	/	/	/	/	/	/	/	/
FLIGHT STATION	UHF-1	(MODE) (COND)	G	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	A	D	D	D	/	/	/	/	/	/	/	/	/	/	/	D	/	/	/	/	/	/	/	/	/
			ADF	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	A	D	D	D	/	/	/	/	/	/	/	/	/	/	/	D	/	/	/	/	/	/	/	/	/
	UHF-1 SELECT		PLAIN VOICE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	A	G	D	D	/	/	/	/	/	/	/	/	/	/	/	D	/	/	/	/	/	/	/	/	/
			CIPHER VOICE	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	D	G	A	D	A	D	/	/	/	/	/	/	/	/	/	/	D	/	/	/	/	/	/	/	/	/
ICS FUNCTIONS MADE AVAILABLE BY SELECTIONS AT COM SEL	MIC SEL		HF-1 (CIPHER D)	→																							G	/	/	D	G	A	D	/	D	G	/	/	D	/	/	/	/	/	/
			HF-1 (CIPHER A)	→																							G	/	/	D	G	A	A	/	D	G	D	D	A	D	D	D	D	D	D
			HF-2 (CIPHER D)	→																							G	/	/	D	G	D	/	D	A	G	/	/	/	D	/	/	/	/	/
			HF-2 (CIPHER A)	→																							G	/	/	D	G	D	/	A	A	G	D	D	D	A	D	D	D	D	D
			HF-1 OR HF-2 (BOTH CIPHERS A)	→																							G	/	/	D	G	A	A	A	A	G	D	D	A	A	D	D	D	D	D
	RECEIVERS		HF-1	→																							/	/	/	/	/	/	/	/	/	/	/	/	/	A	/	/	/	/	/
			HF-2	→																							/	/	/	/	/	/	/	/	/	/	/	/	/	A	/	/	/	/	/
			UHF-1	→																							/	/	/	/	/	/	/	/	/	/	/	/	/	A	/	/	/	/	/
			UHF-2	→																							/	/	/	/	/	/	/	/	/	/	/	/	/	A	/	/	/	/	/
	MIC SEL		UHF-1 (UHF-1 CIPHER D)	→																							A	D	/	D	G	A	/	/	D	G	/	/	/	D	/	/	/	/	/
			UHF-1 (UHF-1 CIPHER A)	→																							A	A	D	D	G	A	/	/	D	G	D	D	D	D	D	D	D	D	D
			UHF-2 (UHF-2 CIPHER D)	→																							G	/	D	A	G	A	/	/	D	G	/	/	/	/	/	D	/	/	/
			UHF-2 (UHF-2 CIPHER A)	→																							G	D	A	A	G	A	/	/	D	G	D	D	D	D	D	A	D	D	D
			ICS	→																							G	/	/	D	G	A	/	/	D	G	/	/	/	/	/	/	/	/	/

A = AMBER, G = GREEN, D = DARK, $\bar{D}$ = AMBER OR GREEN, $\bar{\bar{G}}$ = AMBER OR DARK, $\bar{A}$ = GREEN OR DARK, / = NO INTERLOCK REQUIRED

NOTE

1. POWER ON TO ALL SYSTEMS
2. AVAILABLE FOR SELECTION WHEN ONE OF THE FIVE DATA MODES HAS BEEN SELECTED
3. SYSTEMS NOT IN SELF TEST

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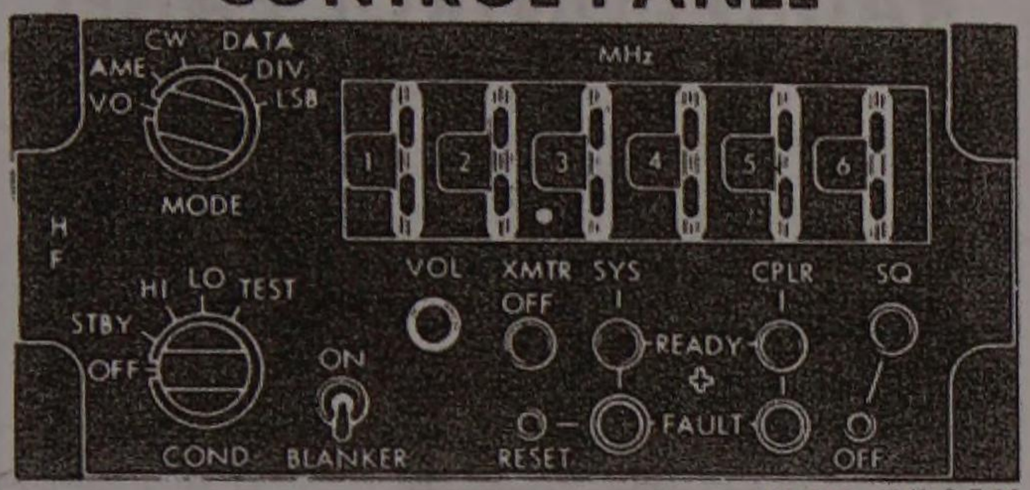
Figure 8-38. Communications System Panel Selector Cueing

HF RADIO CONTROL PANEL



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PANEL MARKING	EQUIPMENT FUNCTION
MODE	
VO	PLAIN VOICE on USB, TTY on USB, DATA USB, DATA USB/ LSB, CIPHER VOICE USB, and CIPHER VOICE USB/LSB modes of HF operation are available and selected on the comm selector panel
AME	Forces PLAIN VOICE on AME mode of HF operation on the comm selector panel. Other modes of HF operation are not available
CW	Inoperative. (All HF-1 or HF-2 mode selectors on the comm selector panel extinguish.)
DATA, DIV, LSB	Not presently used
MHz	Six digital counters select and display tuned frequency in tens, units, tenths, hundredths, thousandths, and ten thousandths of MHz, from 2 to 29.9999 MHz
SQ	Setting of rotating knob controls squelch threshold level in plain voice (VO), AME, and TTY receive modes. An adjacent pushbutton (labeled OFF) may be pressed to disable squelch circuit
OFF	
CPLR	
READY	Indicator lights to indicate antenna coupler properly tuned
FAULT	Indicator lights to indicate antenna coupler not properly tuned within 15 seconds after keying, loss of pressure, or overtemperature
SYS	
READY	Indicator lighted to indicate satisfactory system self-test
FAULT	Indicator flag becomes red to indicate unsatisfactory system self-test
RESET	Pushbutton to restore SYS FAULT circuit to GO condition prior to initiating self-test if it indicates NO-GO condition
XMTR OFF	Indicator lighted to indicate underpressure, overtemperature condition, or overload in RF amplifier; also indicates warmup and channeling
VOL	Volume control inoperative
BLANKER	Inoperative
COND	
TEST	Selector switch position enables HF radio self-test
LO	HF radio set energized and transmitter set for low power output of 400 watts
HI	HF radio set energized and transmitter set for high power output of 1000 watts
STBY	Power applied to RF amplifier final stage filaments, frequency standard, and other critical circuits
OFF	

Figure 8-39. HF Radio Control Panel

of one UHF blade antenna on the top fuselage centerline, a UHF blade antenna located on the top portion of the vertical stabilizer, and UHF-DF/OTPI antenna located at fuselage bottom centerline. (See figure 7-1.) The UHF-2 radio set is connected at all times to the vertical stabilizer antenna, while UHF-1 radio set is connected to the top blade antenna normally and to the UHF-DF/OTPI antenna on the bottom of the fuselage during automatic direction finding operations.

The UHF radios are capable of continuous transmission and reception for 5 minutes under all service conditions. In addition, they are capable of continuous transmission for 30 minutes at temperatures up to +55°C. Warmup time is less than 1 minute under standard conditions, and less than 2 minutes under adverse service conditions. Change-over from receive to transmit mode can be accomplished in 10 milliseconds.

The ARC-143 UHF radio set has 7000 channels, operating in the range of 225.000 to 399.975 MHz. Earlier UHF sets have 3500 channels, operating in the range of 225.000 to 399.95 MHz. Transmitting capabilities are 30 watts in the AM mode, and 100 watts in the FM mode. The following operating modes are provided:

a. AM voice.

b. FSK (for Link 14). Mode forced by comm selector panel.

c. Automatic direction finding–ADF (UHF-1 only), using ARA-50 ADF equipment.

d. FM (UHF-2 only for data link.)

e. Sonobuoy command transmit. (UHF-2 backup only.)

f. Simultaneous guard channel reception with preceding modes.

g. Guard channel transmission.

h. Satellite operation when used with any suitable modem (UHF-1, ARC-143B only).

The following information forms are handled:

a. Voice, plain or cipher.

b. Teletype, plain or cipher. (UHF-2 only.)

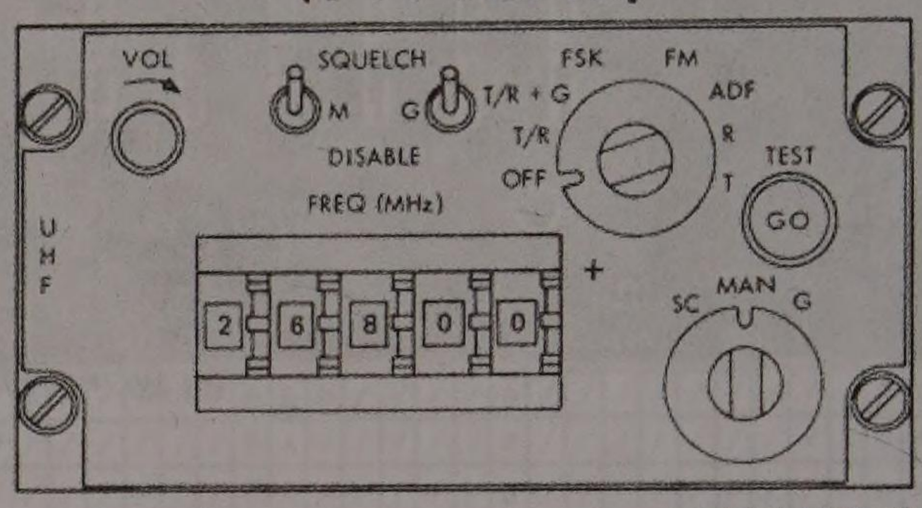
c. Link 11 data, plain or cipher. (UHF-2 only.)

d. Sonobuoy command. (UHF-2 backup only.)

UHF CONTROL PANELS.

Identical UHF control panels (see figure 8-40) are located in the pilot station, on the right side of the center control stand, and in the NAV/COMM station, on the upper left

ARC-143 UHF RADIO CONTROL PANEL (TYPICAL)



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PANEL MARKING	EQUIPMENT FUNCTION
VOL	(Control is inoperative)
M	
SQUELCH	Normal squelch action in main receiver
DISABLE	Squelch disabled in main receiver
G	
SQUELCH	Normal squelch action in guard receiver
DISABLE	Squelch disabled in guard receiver
Function Selector	
R	Receiver self-test
T TEST	Transmitter self-test
GO light	Indicates satisfactory receiver/transmitter check.
ADF	Simultaneous reception of guard and wideband audio AM frequencies; provides bearing output to HSI
FM	FM transmission and reception selected, with simultaneous reception on guard frequency. (Position inoperative on UHF-1 control panel. Mode forced on UHF-2)
FSK	Frequency shift keying function
T/R + G	AM transmission and reception enabled, and guard frequency received
T/R	AM transmission and reception enabled
OFF	

Figure 8-40. UHF Radio Control Panel ARC-143 (Sheet 1 of 2)

UHF RADIO CONTROL PANEL ARC-143 (Cont)

PANEL MARKING	EQUIPMENT FUNCTION
Mode Selector	
SC	AM transmission on preassigned sonobuoy command frequency, with simultaneous AM guard channel reception
MAN	Function selector switch functions enabled
G	AM transmission and reception on guard frequency
FREQ (MHz)	Adjustment of thumbwheels, left to right, determines frequency selection in hundreds, tens, ones, tenths, hundredths, thousandths of MHz. Some models are equipped with knobs to control frequency selection in hundredths of MHz

Figure 8-40. UHF Radio Panel ARC-143 (Sheet 2 of 2)

instrument panel. The control panel in the pilot station controls the UHF-1 radio set and the panel in the NAV/COMM station controls the the UHF-2 radio set.

UHF-1 VOICE SELECTOR PANEL.

The UHF-1 VOICE selector panel (see figure 8-41) is installed in the pilot station on the lower right side of pedestal. This panel is used by the pilot to choose between plain and cipher voice modes of communication with the UHF-1 radio set.

KY-28 Switch. In ON or RLY position supplies normal KY-28 power. Selection of RLY increases the length of the sync signal. It is designed to use when transmitting to a MIDDLEMAN, but it can also be useful when transmitting to a distant station.

TEST Light. Illuminates when NAV/COMM operator energizes test function.

CAUTION

Do not activate the ZEROIZE switch for more than 5 seconds as damage to the KG-35 can result.

ZEROIZE Switch. A spring-loaded switch that destroys both KY-28 and KG-35 code settings. Do not activate unless in-flight reset capability is available.

UHF-1 VOICE SELECTOR PANEL

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Figure 8-41. UHF-1 Voice Selector Panel (Sheet 1 of 2)

UHF-2 SONO COMMAND MODE.

When the mode selector is placed in the sono command mode the following events occur:

a. The output of the reference signal generator, which originates commands to the CASS sonobuoy, is switched from the ASA-76 CASS transmitter to UHF-2 transmitter.

b. Power output of UHF-2 transmitter is reduced to 10 watts.

c. UHF-2 transmitter is internally tuned to 291.4 MHz in the AM mode.

d. UHF-2 transmitter is disconnected from any keying or modulation via communications selector panel.

e. If the function selector is selected to TR + G, reception on the guard channel is still available.

VHF COMMUNICATION SYSTEM 618M-3A.*

The VHF communication system provides two-way voice communications over the 116.000 to 151.975 MHz frequency range. The system consists of the following:

- 618M-3A Transceiver (1)
- 313N-5 VHF Control Unit (1)

The VHF communication system interfaces with the AIC-22 ICS to provide VHF transmit and receive functions to the ICS master control panels at the pilot, copilot, TACCO and NAV/COMM stations, and to provide the VHF receive function to the ICS crew control panels at all other crew stations. The control unit is located on the center control stand at the flight station and provides OFF/PWR/TEST, frequency display and receiver audio gain control.

Aircraft electric power is supplied to the VHF communication system from a 10 amp dc circuit breaker on the aft

*Aircraft BUNO 161122, 161132 and subsequent.

UHF-1 VOICE SELECTOR PANEL (Cont)

SELECTOR	CONDITIONS			
	DARK (not available for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
PLAIN VOICE	OFF, TEST or SC is selected at UHF-1 radio control panel	CIPHER VOICE is selected at UHF-1 voice selector panel	UHF-1 radio set is turned on (initial condition); or G (guard transmission) or ADF is selected at UHF-1 radio control panel; or PLAIN VOICE at UHF-1 voice selector panel is pressed when green; or CIPHER VOICE at UHF-1 voice selector panel is not selected	ICS UHF-1 audio and key-line to UHF-1 radio set AM audio and keyline
CIPHER VOICE	OFF, TEST, G, SC or ADF selected at UHF-1 radio control panel; or KY-28 power is OFF at UHF-1 voice selector panel	PLAIN VOICE is selected at UHF-1 voice selector panel	CIPHER VOICE is pressed when green	KY-28 digital voice lines to UHF-1 radio set wide-band audio. ICS UHF-1 keyline to KY-28 and UHF-1 radio set keylines

Figure 8-41. UHF-1 Voice Selector Panel (Sheet 2 of 2)

electronic circuit breaker panel and two 5 amp dc circuit breakers on the forward load center circuit breaker panel.

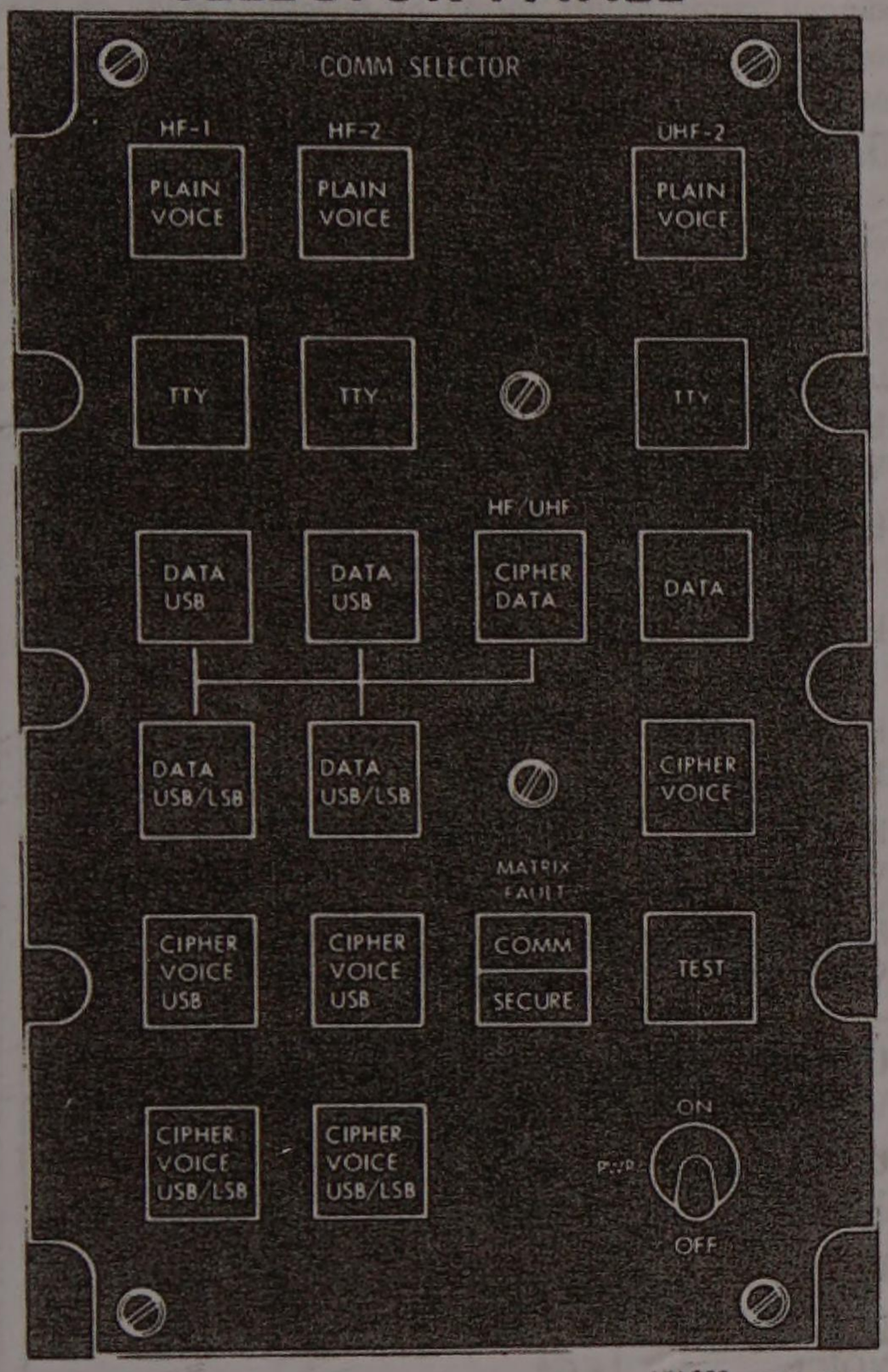
VHF RADIO SET ARC-101.

The VHF receiving-transmitting equipment is provided for voice communication with commercial airfields and airways facilities. The equipment consists of one transmitter, ARC-101, and two receivers identified as VOR-1 and VOR-2, with associated individual control panels, ARN-87. Each receiver is provided with a converter which converts the receiver into a navigation set, providing both ILS localizer and VOR functions. VHF transmissions are possible on 680 channels, spaced 50 kHz apart, and range is line of sight. The operating frequency range is 116.00 to 149.95 MHz for transmission, and 108.00 to 151.95 MHz for reception. A feature of the VHF radio set is the "super" squelch, which can be adjusted manually for any signal level from 1.0 to 25 millivolts. In the communications mode the receiver will remain squelched until the desired RF signal is equal to or greater than the adjusted level. Control of the system is from the pilot station. The VHF communication antenna is located in the tip of the vertical stabilizer. (See figure 7-1.) DC power to the sets is from the monitorable essential dc bus through circuit breakers on the aft electronic circuit breaker panel. AC power (ϕA) is from the monitorable essential ac bus-electronics, on the same panel.

COMMUNICATIONS SELECTOR PANEL.

A communications selector panel (see figure 8-42), located in the NAV/COMM station, and switching matrix perform an interface, control, and selection function among the HF and UHF-2 radio sets with the other aircraft communications equipment having access to these. The panel momentary-type (except the PWR toggle switch and the mechanical latching CIPHER DATA switch), self-illuminated pushbutton-indicators provide manual control of interlocking functions of the associated equipment. Availability of a function is shown by green illumination of the particular pushbutton-indicator; amber illumination signifies that a function has been activated through the

COMMUNICATIONS SELECTOR PANEL



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PANEL MARKING	EQUIPMENT FUNCTION
HF-1, HF-2, UHF-2	
PLAIN VOICE pushbutton-indicators	Selects and indicates plain voice operation of respective radio sets
TTY pushbutton-indicator	Selects and indicates teletype operation of respective radio sets
HF-1, HF-2	
DATA USB pushbutton-indicator	Selects and indicates upper sideband data link operation of respective radio sets
DATA USB/LSB pushbutton-indicator	Selects and indicates upper and lower sideband data link operation of respective radio sets
HF-1, HF-2	
CIPHER VOICE USB pushbutton-indicator	Selects SETAD transmission on upper sideband
CIPHER VOICE USB/LSB pushbutton-indicator	Selects SETAD transmission on upper and lower sideband
HF/UHF	
CIPHER DATA pushbutton-indicator	Selects and indicates cipher mode of operation when HF and UHF radio sets transmitting on a data link
UHF-2	
DATA pushbutton-indicator	Selects and indicates UHF-2 radio set operating in data link mode
CIPHER VOICE pushbutton-indicator	Selects and indicates UHF-2 radio set operating in cipher voice mode
MATRIX FAULT	
COMM indicator	Illuminates to indicate a fault in the communication switching matrix
SECURE indicator	Illuminates to indicate a fault in the secure switching matrix. Indicator illuminates during data link operation to indicate fault in KG-40
TEST pushbutton-indicator	Illuminates amber when pressed to place comm selector panel and UHF-1 voice selector panel in test (off-line) mode. All plain voice pushbutton indicators light amber, all other pushbutton indicators light green. As each green pushbutton is pushed it turns amber if system (comm switching matrix and secure switching matrix) is in a go status. (For audio signals and HSP readouts refer to NAVAIR 01-75PAC-12-3 for proper indications.)
PWR	
ON OFF	Power is applied to interface equipment

Figure 8-42. Communications Selector Panel

matrix switching function. The selector switches also control remotely the mode of the HF and UHF-2 radio sets and data terminal set, depending on which selection is made. Figure 8-43 lists and defines the functions and interlocking arrangements among the various selector switches, between selectors and external equipment, and under what conditions the pushbutton-indicators are unlighted, illuminated green, or illuminated amber. A time delay on external interlocks is provided so that if an interlock is removed and then replaced in less than 0.5 second, it will have no effect. This is provided so that if external equipment selectors are switched through several intermediate positions between two acceptable conditions, reselection on the comm selector panel will not be required. When power is first applied to the comm selector system, plain voice mode will be selected, if external interlocks permit, and active channel pushbutton-indicators will illuminate amber. If power is off to the communications switching matrix, it is forced into plain voice operation.

The operating modes of the UHF-2 and HF radio transceivers are automatically selected or forced when a communication function is selected on the comm selector panel.

The modes which are forced require the operation of peripheral equipment. In the teletype mode, the frequency shift keying is accomplished in the TTY signal data converter and the FSK audio tones are fed into the transceiver on the voice keyline. When either HF DATA USB or DATA USB/LSB are selected: the antenna of the other HF is grounded; the selected HF is placed in control of the ACQ-5 data terminal set for either reception or transmission; and the data link composite audio tones are fed into the selected transceiver on the voice keyline. When UHF-2 DATA mode is selected: the transceiver changes to the FM mode and changes output power from 30 to 100 watts, the transceiver is placed in control of the ACQ-5 for reception or transmission; and the data link composite audio tones are fed into UHF-2 on the voice keyline. The CIPHER DATA switch does not affect the transceiver modes, but does determine whether or not the transmitted data is encrypted. When HF CIPHER VOICE USB or CIPHER VOICE USB/LSB is selected: the antenna of the other HF is grounded; the selected HF is placed in control of the ACQ-5 data terminal set for either reception or transmission; and the SETAD composite audio tones are fed into the selected transceiver on the voice keyline. When UHF CIPHER VOICE is selected the KY-28 voice encrypting device is switched into the microphone keyline. Modes which are not forced are controlled at the radio control panel, and when activated take precedence over selections on the comm selector panel. The HF modes not forced are AME, CW or TEST. The UHF-2 modes not forced are SC, G and TEST. UHF-1 radio modes are not subject to forcing.

The VHF radio is independent of all other radio sets and their function selectors. The following table lists the radio communication modes forced by selections made on the comm selector panel at the NAV/COMM station: (Also see FO-2).

SELECTION	RADIO MODE FORCED	REQUIRED RADIO CONTROL PANEL POSITIONS
HF PLAIN VOICE	HF VOICE ON USB	HF COND switch at HI or LO, MODE switch at any but AME, or CW
HF TTY	HF VOICE ON USB	
HF DATA USB	HF VOICE ON USB	
HF DATA USB/ LSB	HF VOICE ON USB/LSB	
HF CIPHER VOICE USB	HF VOICE ON USB	
HF CIPHER VOICE USB/LSB	HF VOICE ON USB/LSB	
UHF-2 PLAIN VOICE	UHF-2 T/R or T/R + G*	UHF-2 COND switch at MAN, MODE switch at any position but OFF or TEST
UHF-2 TTY	UHF-2 T/R or T/R + G*	
UHF-2 DATA	UHF-2 FM	
UHF-2 CIPHER VOICE	UHF-2 T/R or T/R + G*	
*When the MODE switch is at T/R + G, the forced mode will be T/R + G. When the MODE switch is at any position but OFF, T/R + G, or TEST, the forced mode will be T/R.		

SETAD CONTROL INDICATOR C-9095/UYQ-8.

The control indicator panel (see figure 8-44) provides switching and display required for the SETAD system modes of operation. See sensor station 1 and 2 of this section for a complete description of the UYQ-8 system.

DATA TERMINAL SET (DATA LINK) ACQ-5.

The data terminal set is a communications link which provides computer-to-computer exchange of tactical ASW data between the P-3C and other participating units. Tactical ASW data is accumulated by the operational program and selected data is encoded in Link 11 format. It is then transmitted to the other participating units which make

COMMUNICATIONS SELECTOR INTERLOCK DETAILS AND INTERFACE CONNECTIONS

SELECTOR	CONDITIONS			
	DARK (not available for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
HF-1 PLAIN VOICE	OFF, TEST or CW is selected at HF-1 radio control panel	HF-1 TTY, DATA or CIPHER VOICE is selected at comm selector panel	HF-1 radio set and/or comm selector panel is turned on (initial condition); or AME is selected on HF-1 radio control panel; or HF-1 PLAIN VOICE, at comm selector panel is pressed when green; or No other HF-1 selections are made at comm selector panel	ICS HF-1 audio and keyline to HF-1 radio set USB audio and keyline
HF-1 TTY	OFF, TEST, AME or CW is selected at HF-1 radio control panel	HF-1 PLAIN VOICE, DATA or CIPHER VOICE; or HF-2 or UHF-2 TTY is selected at comm selector panel	HF-1 TTY at comm selector panel is pressed when green	TTY signal data converter (A335) audio and keyline to HF-1 radio set USB audio and keyline
HF-1 DATA USB	OFF, TEST, AME or CW is selected at HF-1 radio control panel; or OFF or TEST is selected at DTS monitor control panel	HF-1 PLAIN VOICE, TTY, DATA USB/LSB or CIPHER VOICE; or HF-2 DATA or CIPHER VOICE; or UHF-2 DATA is selected at comm selector panel	HF-1 DATA USB at comm selector panel is pressed when green	Data terminal set primary (receive) and composite (transmit) audio and keyline to HF-1 radio set USB audio and keyline

Note

All HF-1 selectors extinguish (dark) when HF-2 DATA USB, DATA USB/LSB, CIPHER VOICE USB, or CIPHER VOICE USB/LSB are pressed, or when HF-2 is keyed in tune cycle.

Figure 8-43. Communications Selector Interlock Details and Interface Connections (Sheet 1 of 5)

COMMUNICATIONS SELECTOR INTERLOCK DETAILS AND INTERFACE CONNECTIONS (Cont)

SELECTOR	CONDITIONS			
	DARK (not available for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
HF-1 DATA USB/LSB	Same as HF-1 DATA USB	HF-1 PLAIN VOICE, TTY, DATA USB or CIPHER VOICE; or HF-2 DATA or CIPHER VOICE; or UHF-2 DATA is selected at comm selector panel	HF-1 DATA USB/LSB at comm selector panel is pressed when green	Data terminal set primary and secondary audio to HF-1 USB and LSB receive audio respectively, DTS composite audio to HF-1 USB and LSB transmit audio (parallel), DTS keyline to HF-1 keyline
HF-1 CIPHER VOICE USB	Same as HF-1 DATA USB	HF-1 PLAIN VOICE, TTY, DATA or CIPHER VOICE USB/LSB; or HF-2 DATA or CIPHER VOICE USB/LSB; or UHF-2 DATA is selected at comm selector panel	HF-1 CIPHER VOICE USB at comm selector panel is pressed when green	Same as HF-1 DATA USB, and ICS HF-1 keyline to digital voice controller
HF-1 CIPHER VOICE USB/LSB	Same as HF-1 DATA USB	HF-1 PLAIN VOICE, TTY, DATA, or CIPHER VOICE USB; or HF-2 DATA or CIPHER VOICE; or UHF-2 DATA is selected at comm selector panel	HF-1 CIPHER VOICE USB/LSB at comm selector panel is pressed when green	Same as HF-1 DATA USB/LSB, and ICS HF-1 keyline to digital voice controller
HF-2 PLAIN VOICE	OFF, TEST or CW is selected at HF-2 radio control panel	HF-2 TTY, DATA or CIPHER VOICE is selected at comm selector panel	HF-2 radio set and/or comm selector panel is turned on (initial condition); or	ICS HF-2 audio and keyline to HF-2 radio set USB audio an keyline

Figure 8-43. Communications Selector Interlock Details and Interface Connections (Sheet 2 of 5)

COMMUNICATIONS SELECTOR INTERLOCK DETAILS AND INTERFACE CONNECTIONS (Cont)

SELECTOR	CONDITIONS			
	DARK (not available for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
HF-2 PLAIN VOICE (Cont)	**Note** All HF-2 selectors extinguish (dark) when HF-1 DATA USB, DATA USB/LSB, CIPHER VOICE USB, or CIPHER VOICE USB/LSB are pressed, or when HF-1 is keyed in tune cycle		AME is selected on HF-2 radio control panel; or HF-2 PLAIN VOICE at comm selector panel is pressed when green; or No other HF-2 selections are made at comm selector panel	
HF-2 TTY	OFF, TEST, AME or CW is selected at HF-2 radio control panel	HF-2 PLAIN VOICE, DATA or CIPHER VOICE; or HF-1, or UHF-2 TTY is selected at comm selector panel	HF-2 TTY at comm selector panel is pressed when green	TTY signal data converter (A335) audio and keyline to HF-2 radio set USB audio and keyline
HF-2 DATA USB	OFF, TEST, AME or CW is selected at HF-2 radio control panel; or OFF or TEST is selected at DTS monitor-control panel	HF-2 PLAIN VOICE, TTY, DATA USB/LSB or CIPHER VOICE; or HF-1 DATA or CIPHER VOICE; or UHF-2 DATA, is selected at comm selector panel	HF-2 DATA USB at comm selector panel is pressed when green	Data terminal set primary (receive) and composite (transmit) audio and keyline to HF-2 radio set USB audio and keyline
HF-2 DATA USB/LSB	Same as HF-2 DATA USB	HF-2 PLAIN VOICE, TTY, DATA USB or CIPHER VOICE; or HF-1 DATA or CIPHER VOICE; or UHF-2 DATA is selected at comm selector panel	HF-2 DATA USB/LSB at comm selector panel is pressed when green	Data terminal set primary and secondary audio to HF-2 USB and LSB receive audio respectively, DTS composite audio to HF-2 USB and LSB transmit audio (parallel), DTS keyline to HF-2 keyline

Figure 8-43. Communications Selector Interlock Details and Interface Connections (Sheet 3 of 5)

COMMUNICATIONS SELECTOR INTERLOCK DETAILS AND INTERFACE CONNECTIONS (Cont)

SELECTOR	CONDITIONS			
	DARK (not available for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
HF-2 CIPHER VOICE USB	Same as HF-2 DATA USB	HF-2 PLAIN VOICE, TTY, DATA or CIPHER USB/LSB; or HF-1 DATA or CIPHER VOICE USB/LSB; or UFH-2 DATA is selected at comm selector panel	HF-2 CIPHER VOICE USB at comm selector panel is pressed when green	Data terminal set primary (receive) connector to HF-2 USB receive audio unless: HF-1 CIPHER VOICE USB has also been selected in which case DTS secondary (receive) audio would be connected to HF-2 USB receive audio DTS composite audio to HF-2 USB transmit audio DTS keyline to HF-2 radio set keyline ICS HF-2 keyline to digital voice controller
HF-2 CIPHER VOICE USB/ LSB	Same as HF-2 DATA USB	HF-2 PLAIN VOICE, TTY, DATA or CIPHER VOICE; or HF-1 DATA or CIPHER VOICE, or UHF-2 DATA is selected at comm selector panel	HF-2 CIPHER VOICE USB/LSB at comm selector panel is pressed when green	Same as HF-2 DATA USB/ LSB and ICS HF-2 keyline to digital voice controller
CIPHER DATA	None of the following comm selector panel indicators are amber: HF-1 DATA USB HF-1 DATA USB/LSB HF-2 DATA USB HF-2 DATA USB/LSB UHF-2 DATA	CIPHER DATA pressed when amber (alternate action, mechanically latching)	CIPHER DATA pressed when green (alternate action, mechanically latching)	KG-40 placed in cipher mode

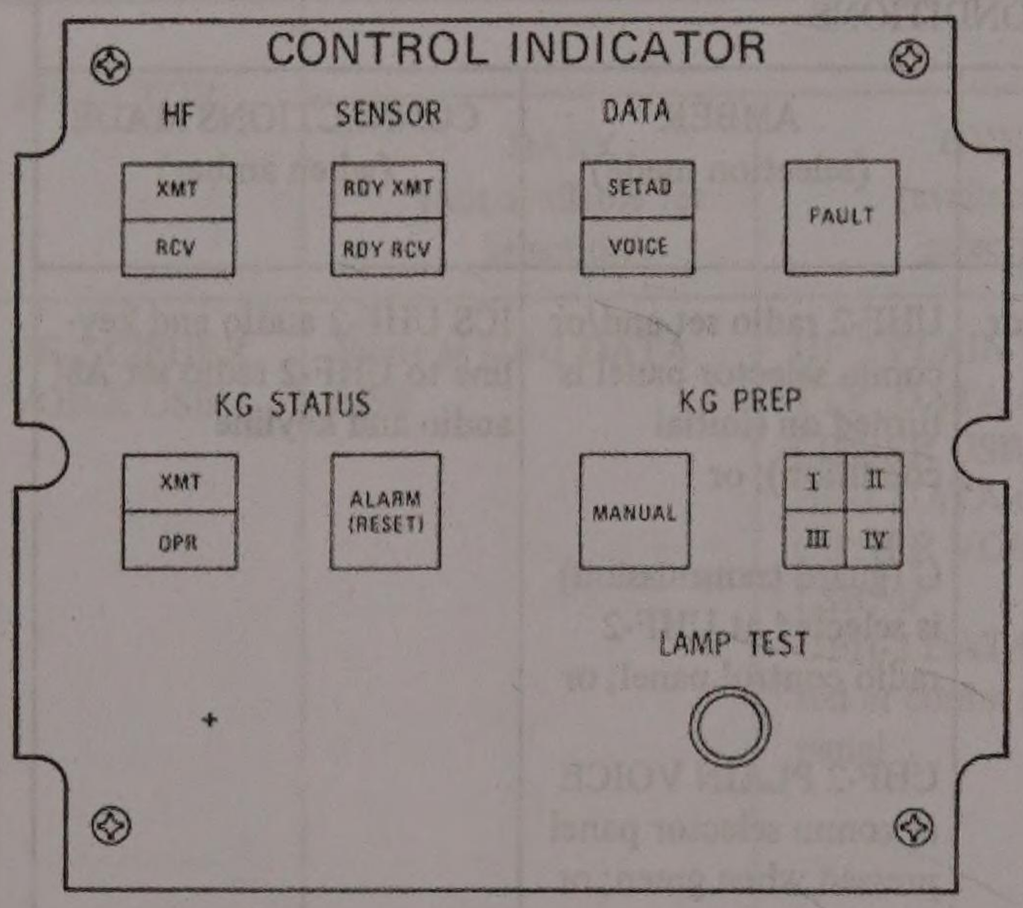
Figure 8-43. Communications Selector Interlock Details and Interface Connections (Sheet 4 of 5)

COMMUNICATIONS SELECTOR INTERLOCK DETAILS AND INTERFACE CONNECTIONS (Cont)

SELECTOR	CONDITIONS			
	DARK (not available for selection)	GREEN (available for selection)	AMBER (selection made)	CONNECTIONS MADE (when amber)
UHF-2 PLAIN VOICE	OFF, TEST or SC is selected at UHF-2 radio control panel	UHF-2 TTY, DATA or CIPHER VOICE is selected at comm selector panel	UHF-2 radio set and/or comm selector panel is turned on (initial condition); or G (guard transmission) is selected at UHF-2 radio control panel; or UHF-2 PLAIN VOICE at comm selector panel pressed when green; or No other UHF-2 selections are made at comm selector panel	ICS UHF-2 audio and keyline to UHF-2 radio set AM audio and keyline
UHF-2 TTY	OFF, TEST, SC or G is selected at UHF-2 radio control panel	UHF-2 PLAIN VOICE, DATA or CIPHER VOICE; or HF-1 or HF-2 TTY selected at comm selector panel	UHF-2 TTY pressed when green	TTY signal data converter (A335) audio and keyline to UHF-2 radio set AM audio and keyline. UHF/HF radio select line grounded to A335
UHF-2 DATA	Same as UHF-2 TTY; or OFF or TEST is selected at DTS monitor-control panel	UHF-2 PLAIN VOICE, TTY or CIPHER VOICE; or HF-1 or HF-2 DATA or CIPHER VOICE selected at comm selector panel	UHF-2 DATA pressed when green	Data terminal set primary (recieve) and composite (transmit) audio and keyline to UHF-2 radio set FM audio and keyline
UHF-2 CIPHER VOICE	Same as UHF-2 PLAIN VOICE; or CIPHER VOICE amber or KY-28 power is off at UHF-1 voice selector panel	UHF-2 PLAIN VOICE, TTY or DATA selected at comm selector panel	UHF-2 CIPHER VOICE pressed when green	KY-28 digital voice lines to UHF-2 radio set wide-band audio. ICS UHF-2 keyline to KY-28 and UHF-2 radio set keylines

Figure 8-43. Communications Selector Interlock Details and Interface Connections (Sheet 5 of 5)

CONTROL INDICATOR C-9095/UYQ-8



PANEL MARKING	EQUIPMENT FUNCTION
HF	
XMT	Initiates the push-to-talk (PTT) command to A368 provided an HF1-USB or HF1-DIV or HF2-USB or HF2-DIV signal is present from A370, primary 28 Vdc is present and a RDY XMT status signal is available from the converter control. The switch closure also provides a XMT status signal to the converter control and provides the initiate XMT sequence to the converter. Light comes on amber when pressed
RCV	Initiates the system receive provided the HF signals (as above) are present from the A370, primary 28 Vdc is present and a RDY RCV signal is available from the converter control. The switch closure also inhibits PTT, inhibits initiate XMT sequence to the converter and prevents manual and automatic PREP of the KG. Light comes on amber when pressed

PANEL MARKING	EQUIPMENT FUNCTION
SENSOR	
RDY XMT	Light comes on amber when RDY XMT status signal is available from the converter control
RDY RCV	Light comes on amber when RDY RCV status signal is available from the converter control
DATA	
SETAD/ VOICE	Provides capability for voicecoder interface. Presently SETAD is provided in either switch position
FAULT	Indicates loss of PCM output from the converter. The light comes on white when there is a fault
KG STATUS	
XMT/OPR	Light comes on XMT and OPR amber when KG is transmitting. Light comes on OPR amber when KG is receiving
ALARM (RESET)	Remote reset for KG-35 alarm circuitry. Light comes on white for alarm and goes out if reset clears alarm
KG PREP	
MANUAL	Command the converter to provide momentary ground (50 msec to 100 msec) to KG PREP circuitry. Light comes on green whenever the KG can accept a manual PREP
I-II-III-IV	Commands the converter to provide automatic PREP signals to the KG PREP circuitry. PREP signal has a 50 to 100 msec duration with a rate of: I – once per 8 seconds II – once per 16 seconds III – once per 32 seconds IV – once per 64 seconds The light comes on amber for each segment as the switch is indexed
LAMP TEST	28 Vdc front panel light test command for the control indicator. All panel indicators illuminate when the switch is pressed

Figure 8-44. Control Indicator C-9095/UYQ-8

up the data net. Data received from other participating units in the data net are decoded and converted to a format acceptable to the computer program. The data link system includes provisions for aircraft retiring from on-station duty to exchange information with relief aircraft.

CONTROLS AND INDICATORS.

Data Terminal Set Control-Monitor Panel (Figure 8-45).

The POWER/FAULT (AA) switch applies power to the data terminal set, illuminates the POWER indicator amber and momentarily illuminates the FAULT indicator yellow. The yellow FAULT indicator extinguishes as soon as the power supply output has reached operating voltage. The FAULT indicator illuminates yellow at any time a fault occurs in the power supply. A second POWER/FAULT switch depression removes power from the data terminal set, extinguishes the amber POWER indicator, and returns the switch to the non-pressed position.

The upper test light illuminates green to indicate the test function is available. TEST/TEST switch depression initiates a self-test of the data terminal set (DTS) and the digital voice controller (DVC), illuminates the lower TEST light amber, and extinguishes the upper TEST light. Within 10 seconds, either the DTS GO indicator or the DTS NO-GO indicator illuminates yellow to indicate a satisfactory or unsatisfactory self-test of the data terminal set; and either the DVC GO indicator or the DVC NO-GO indicator illuminates yellow to indicate satisfactory or unsatisfactory self-test of the digital voice controller. A second TEST/TEST switch depression terminates the self-test, extinguishes the DTS GO or DTS NO-GO indicator, extinguishes the lower TEST light, and illuminates the upper TEST light green. TEST/TEST switch depression during an information message transmission programs the system to initiate a self-test after transmission is completed.

The DATA/VOICE (AA) switch selects either data link (DATA), or digital voice (VOICE) mode of operation and illuminates either the DATA or the VOICE indicator amber. Data mode of operation activates the RADIO SILENCE/RADIO SILENCE, FAULT (RESET), XMIT/RECEIVE, PICKET/CONTROL, INT SYNC/NET SYNC, DATA FAST/DATA SLOW, INT NORM/INT LONG, ERROR DETECT/ERROR CORRECT, SHORT BC/SHORT BC, LONG BC/LONG BC, and ROLL CALL/

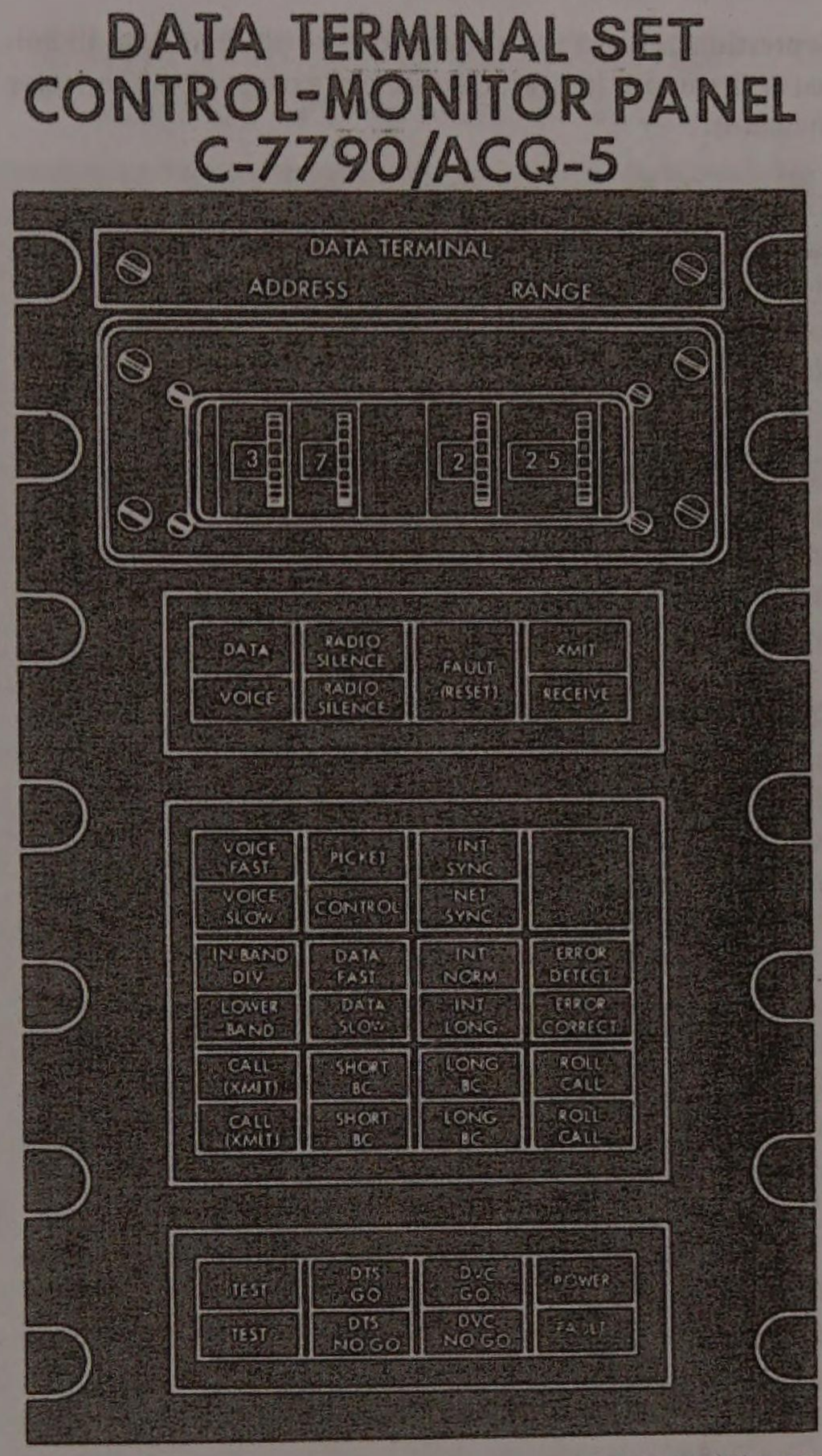


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Figure 8-45. Data Terminal Set Control-Monitor Panel C-7790/ACQ-5

ROLL CALL switches and indicators. Voice mode of operation activates the FAULT (RESET), XMIT/RECEIVE, VOICE FAST/VOICE SLOW, IN BAND DIV/LOWER BAND and CALL (XMIT)/CALL (XMIT) switches and indicators. Pressing any of the five DATA switches or any of the four HF CIPHER VOICE switches (located on the NAV/COMM communications selector panel) also selects either data link or digital voice mode of operation, respectively and illuminates either the DATA or VOICE indicator amber.

The RADIO SILENCE/RADIO SILENCE (AA) switch depression during data link operation inhibits automatic transmission (picket) or interrogation transmission (DNCU) and illuminates the lower indicator amber. A second switch

depression returns the system to normal operation, illuminates the upper indicator green and extinguishes the lower indicator.

The FAULT (RESET) indicator illuminates yellow to indicate the fault detection circuitry has detected a malfunction. Switch depression resets the detection circuitry and extinguishes the FAULT (RESET) indicator if the malfunction was momentary.

The XMIT/RECEIVE indicator illuminates white to indicate the data link or digital voice system is transmitting or receiving. An illuminated RECEIVE indicator also indicates the received signal is of sufficient strength for synchronization.

The VOICE FAST/VOICE SLOW (AA) switch selects either fast digital voice data rate (2400 bits per second) or slow digital voice data rate (1200 bits per second), and illuminates either the VOICE FAST or VOICE SLOW indicator amber. Each unit of the communication net must select the same data rate to achieve synchronization.

A VOICE SLOW selection also illuminates either the IN BAND DIV (independent band diversity) or the LOWER BAND (lower band diversity) indicator amber as determined by the last selection made on the IN BAND DIV/ LOWER BAND switch.

The IN BAND DIV/LOWER BAND (AA) switch selects either independent band diversity or lower band diversity mode of operation of the digital voice system when VOICE SLOW is selected, and illuminates either the IN BAND DIV or LOWER BAND indicator amber. The eight tones in the upper sideband are duplicated in the lower sideband during IN BAND DIV operation. This reduces the effects of fading at selective frequencies and/or sidebands. Only the eight tones in the lower sideband carry the data during LOWER BAND operation. The increased effective power of this SSB operation reduces the effect of flat (general) fading and interference by increasing the signal-to-noise ratio.

The CALL (XMIT)/CALL (XMIT) momentary switch initiates a clear alert transmission which alerts a remote station to an impending digital voice communication, and illuminates the lower indicator amber (either steady or flashing). No additional switching is required for the clear alert transmission. A mic switch depression prior to and during the CALL (XMIT) switch depression is required for secure alert transmission. The upper indicator illuminates green (VOICE selected on DATA VOICE switch) to indicate the digital voice system is available but inactive. The upper indicator extinguishes and the lower indicator illuminates a steady amber to indicate transmission or reception of a clear alert. The upper indicator extinguishes and the lower indicator flashes amber to indicate the transmission or reception of a secure alert.

The PICKET/CONTROL (AA) switch selects either picket unit or data net control unit operation of the data link system, and illuminates either the PICKET or CONTROL indicator amber. CONTROL is selected by the designated data net control unit (DNCU) and PICKET selected by each of the other participating units.

The DATA FAST/DATA SLOW (AA) switch selects either fast data rate (2250 bits per second) or slow data rate (1364 bits per second) of data link transmission and reception, and illuminates either the DATA FAST or DATA SLOW indicator amber. DATA SLOW selection also illuminates either the previously selected INT NORM (integrate normal) or INT LONG (integrate long) indicator amber.

The SHORT BC/SHORT BC momentary switch initiates a short data link test broadcast sequence, extinguishes the upper indicator and illuminates the lower indicator amber. A short broadcast command overrides an active RADIO SILENCE mode. The lower indicator extinguishes and the upper indicator illuminates green to indicate completion of the short broadcast sequence.

The INT SYNC/NET SYNC (AA) switch selects either internal synchronization or network synchronization of the data link system, and illuminates either the INT SYNC or NET SYNC indicator lamp. NET SYNC is used to establish a common transmission and reception frame period for each unit of the data net. The DNCU presses NET SYNC, initiating the 2-minute transmission of continuous preamble. The transmission is received by the picket units and used for automatic framing adjustments. This ensures that each picket unit receives one frame of data for each frame transmitted by the DNCU. After approximately 2 minutes of transmission each picket unit selects INT SYNC. The DNCU then selects INT SYNC, terminating the transmission. INT SYNC is used by all data net participating units (after NET SYNC has been completed) to cause the system to readjust the frame alignment during the preamble (first five frames transmitted) for each received data transmission.

The INT NORM/INT LONG (AA) switch selects either a normal integration period (INT NORM) or a long integration period (INT LONG) for incoming data, and illuminates either the INT NORM or INT LONG indicator amber. The switch is functional only when DATA SLOW is selected and INT NORM is the normal selection.

The LONG BC/LONG BC (AA) switch initiates a long data link test broadcast sequence, extinguishes the upper indicator and illuminates the lower indicator amber. The long broadcast overrides an active RADIO SILENCE. A second switch depression terminates the broadcast sequence, extinguishes the lower indicator and illuminates the upper indicator green.

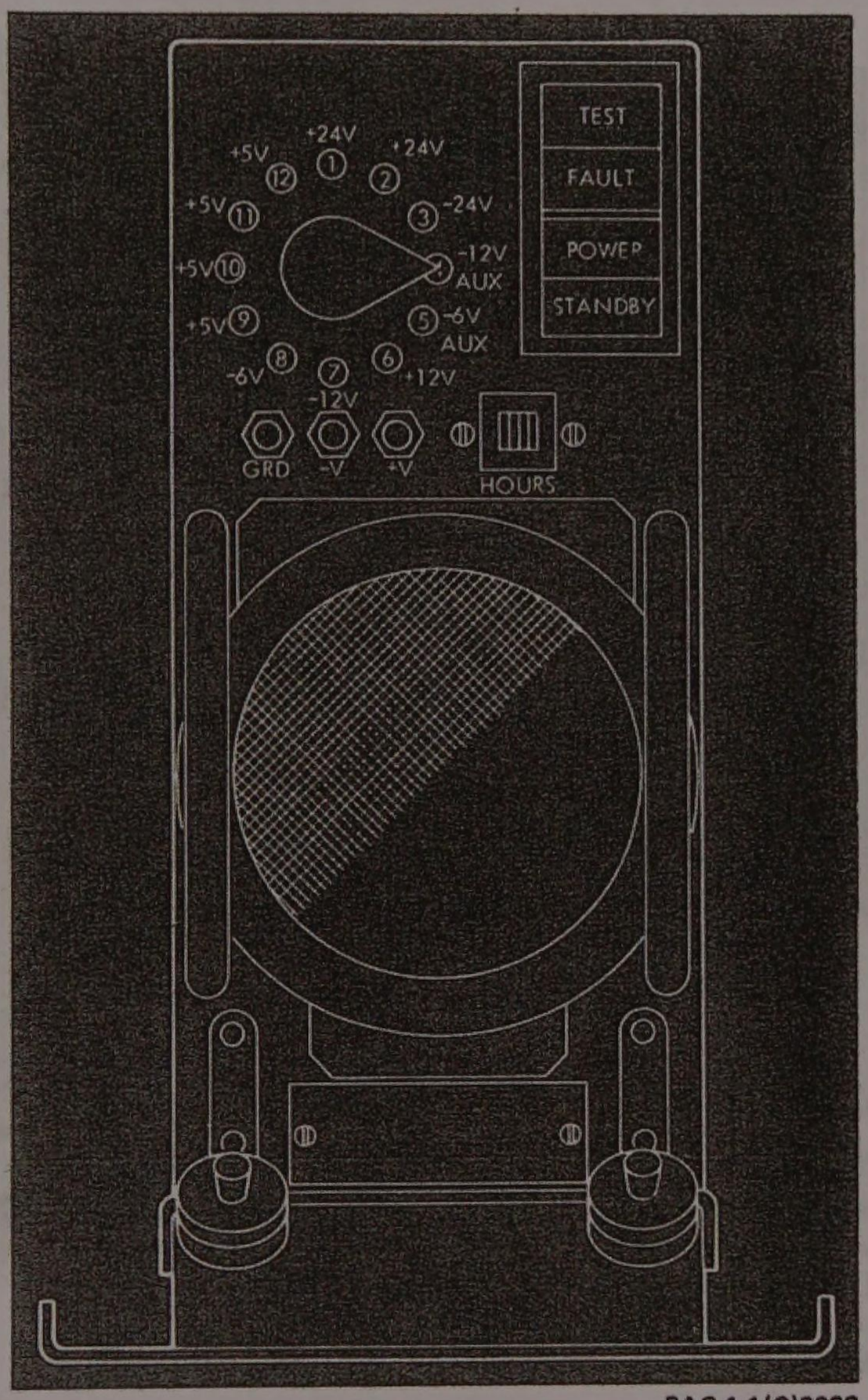
The ERROR DETECT/ERROR CORRECT (AA) switch selects either error detection or error detection and correction processing of received data link signals, and illuminates either the ERROR DETECT or ERROR CORRECT indicator amber. The data link system detects single-bit errors within a received frame, labels the frame as an error detect frame, and routes it to the computer program during ERROR DETECT processing. The data link system detects single-bit errors within a received frame, corrects the error bit, and routes the frame to the computer program during ERROR CORRECT processing.

The ROLL CALL/ROLLCALL (AA) switch initiates a data link roll call transmission from the data net control unit, and illuminates the lower indicator amber. The first roll call transmission is an interrogation which contains the address of the first picket unit to report. The picket unit responds by transmitting all selected data to each participant in the data net. The data net control unit then transmits a second roll call interrogation containing the address of the second picket unit to report, and so forth, until each participating unit of the net (including the DNCU) has transferred data. A second ROLL CALL/ROLL CALL switch depression terminates the roll call transmission, extinguishes the lower indicator and illuminates the upper indicator green.

The ADDRESS thumbwheel switches select and display the address (track number) of the participating unit. The address (01_8-76_8) of each participating unit of a data net is assigned by the DNCU prior to net initialization, and each participating unit must enter the assigned address on these switches to enable the data link system to respond to interrogations directed to the assigned address.

The RANGE thumbwheel switches select and display the range in nautical miles to the DNCU. The left switch selects the hundreds of miles digit from 0 to 7. The right switch selects the tens and unit miles digit in four detent positions which indicate 00, 25, 50, and 75. The initial range to the DNCU is established prior to net initialization. The range is updated by the operator to compensate for propagation delay between the picket and the DNCU. CONTROL selection on the PICKET/CONTROL switch (DNCU) forces a range selection of 000. Range switch selections are not required with units capable of fast synchronization. They are not required for the P-3C and most stations.

DATA TERMINAL SET POWER SUPPLY PP-6140/ACQ-5



PAC-1.1(C)0032

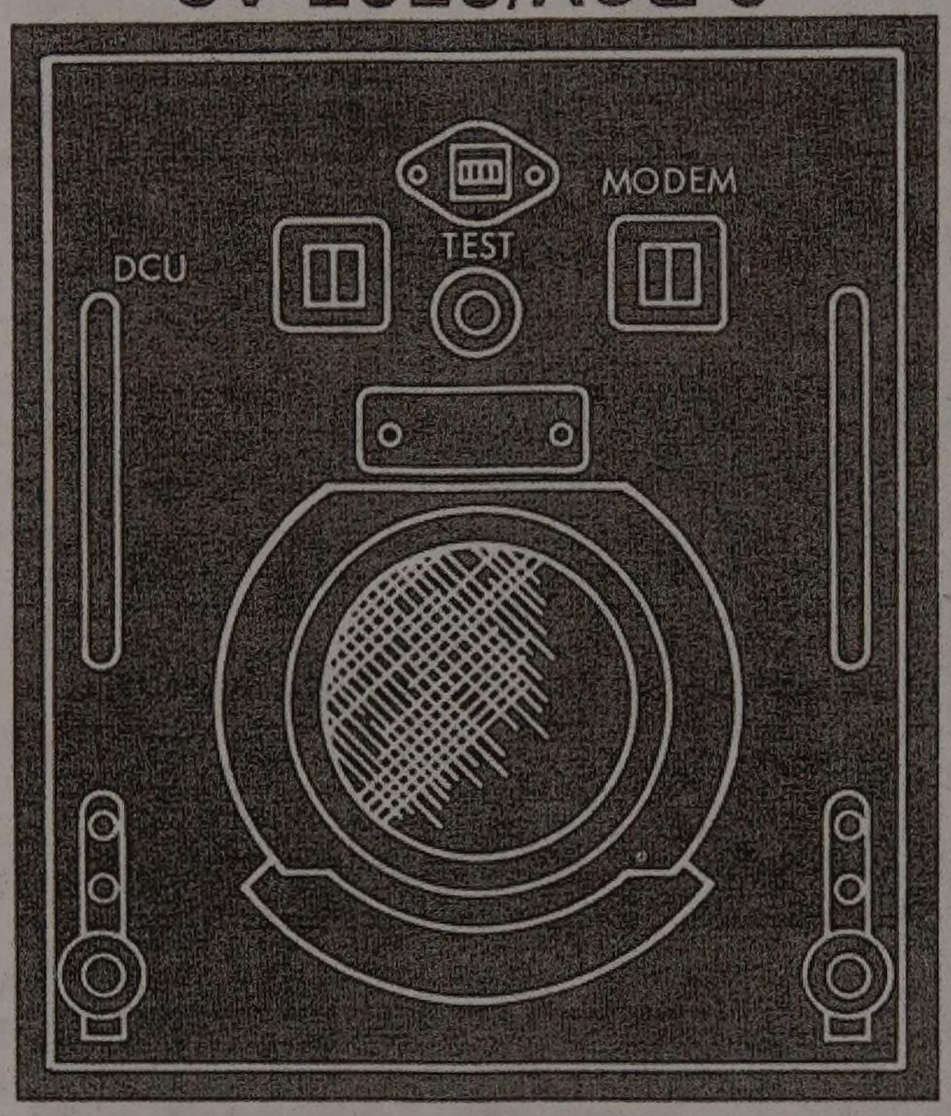
Figure 8-46. Data Terminal Set Power Supply PP-6140/ACQ-5

Data Terminal Set Power Supply (Figure 8-46).
The TEST/FAULT switch initiates a test of the power supply selected on the test selector switch. The FAULT indicator illuminates red to indicate the power supply voltage selected by the test selector switch exceeds specified limits.

The POWER/STANDBY switch applies standby power (DTS monitor control panel POWER/FAULT switch off) or primary power (DTS monitor control panel POWER/FAULT switch on) to the data terminal set, and illuminates the POWER or STANDBY indicator amber.

The test selector switch selects the power supply voltage which is tested by TEST/FAULT switch depressions.

DATA TERMINAL SET CONVERTER-CONTROLS CV-2528/ACQ-5



PAC-1.1(C)0033

Figure 8-47. Data Terminal Set Converter-Control CV-2528/ACQ-5

Data Terminal Set Converter-Controls. (Figure 8-47.)

The TEST switch initiates a self-test of the two subassemblies of the converter control unit. The left indicator illuminates a code to locate a malfunction in digital control unit (DCU) and the right indicator illuminates a code to locate a malfunction in the converter MOdulator-DEModulator (MODEM).

Data Terminal Set Digital Voice Controller. (Figure 8-48.)

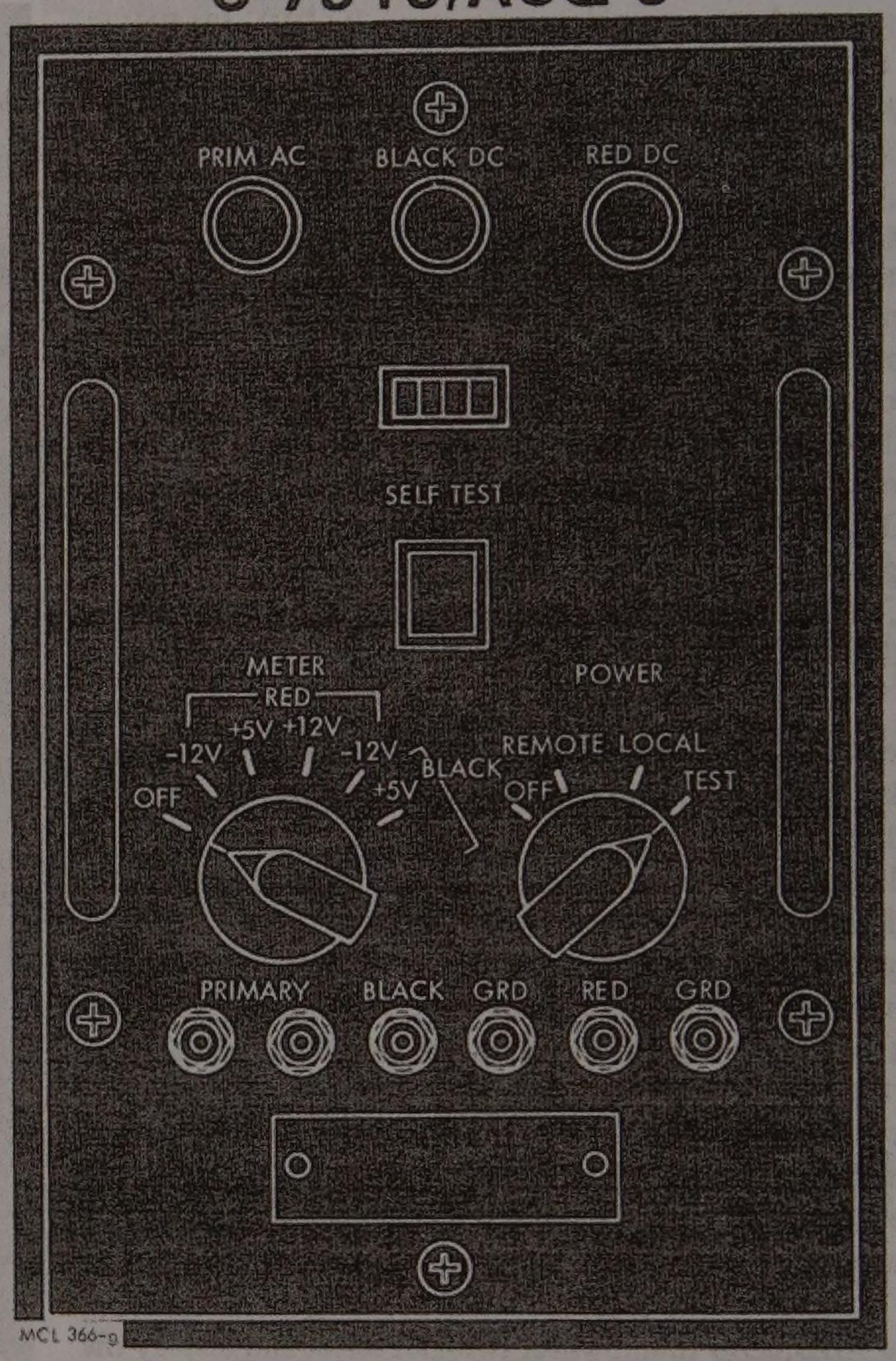
The POWER switch selects various modes of digital voice controller operation as follows:

OFF removes power from the digital voice controller. Power is applied to the unit in each of the three other positions of the switch.

REMOTE selects the remote TEST/TEST switch on the DTS monitor control panel to control the system self-test.

LOCAL selects the METER switch to control the testing of the digital voice controller power supplies. The test jacks are used to measure the power supply outputs.

DTS DIGITAL VOICE CONTROLLER C-7919/ACQ-5



PAC-1.1(C)0034

Figure 8-48. DTS Digital Voice Controller C-7919/ACQ-5

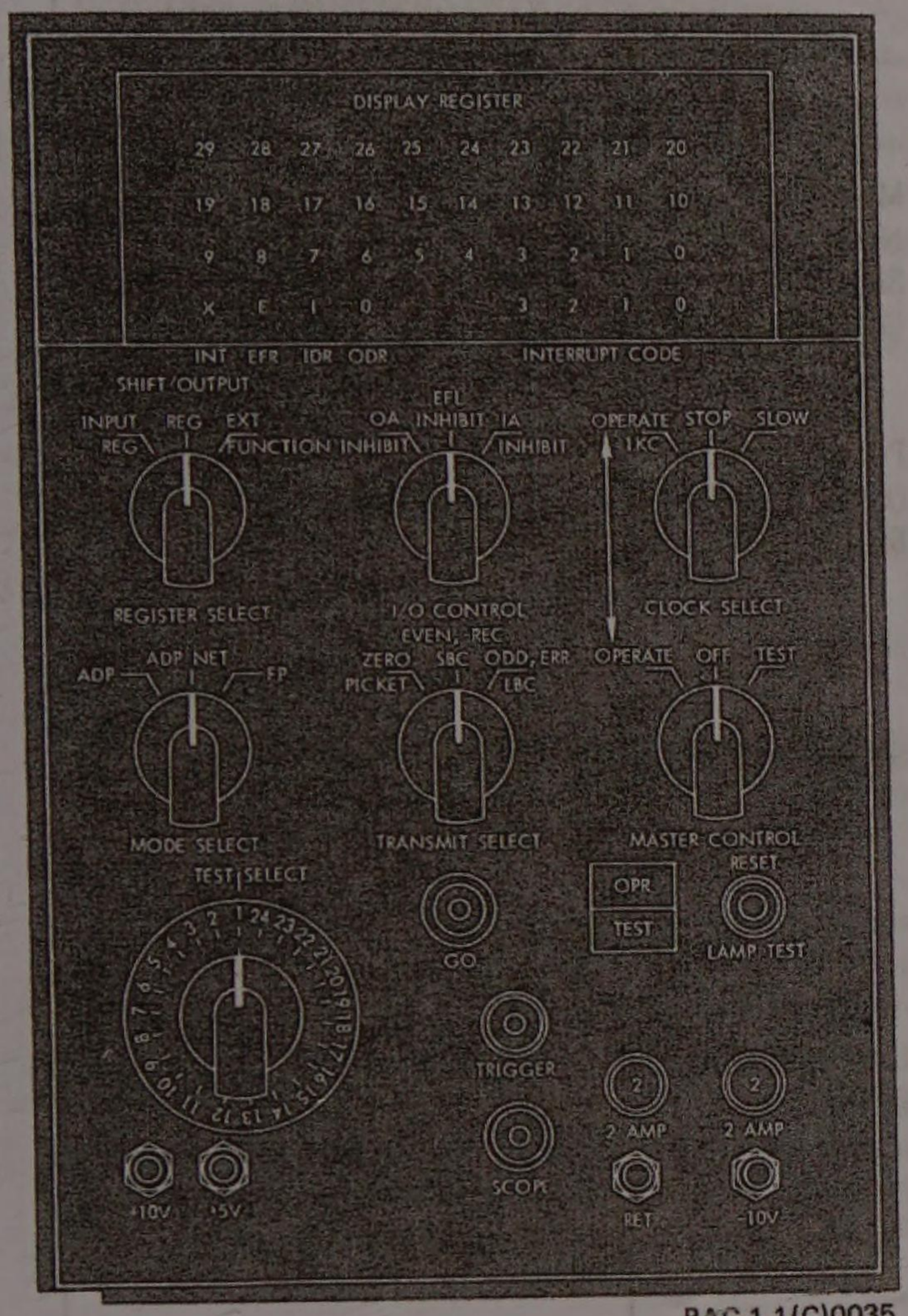
TEST initiates a self-test of the digital voice controller. The SELF TEST light illuminates a code to locate a fault in the digital voice controller.

The SELF TEST light illuminates a code to locate a digital voice controller fault during a self-test selected by the TEST position of the POWER switch.

COMMUNICATIONS INTERFACE NO. 2. (Figure 8-49.)

Communications interface No. 2 interfaces the ASQ-114 digital computer with the data link system. It functions to change 30-bit parallel transmitted data from the ASQ-114 into 26-bit serial data for encryption by the KG-40. (See figure FO-2.)

COMMUNICATIONS INTERFACE NO. 2



PAC-1.1(C)0035

Figure 8-49. Communications Interface No. 2

The MASTER CONTROL switch selects the mode of operation of the communications interface as follows:

OFF removes power from the communications interface and extinguishes all panel lights. Power is applied to the interface in each of the two other positions.

OPERATE selects normal on-line operation between the digital computer and the data terminal set, and illuminates the white OPR light. It disables all switches on the communications interface No. 2, except the CLOCK SELECT switch in this mode of operation.

TEST illuminates the white TEST light and selects a test mode of operation in which communications interface No. 2 outputs are switched to internal test circuits. All switches and indicators are enabled in this mode of operation.

The CLOCK SELECT switch selects the rate that data is cycled within the communications interface as follows:

OPERATE 1 KC selects a 1 kHz cyclic data rate for on-line operation with the digital computer.

STOP freezes the internal cyclic data rate to enable exact readout of data on the DISPLAY REGISTER lights during a TEST mode of operation.

SLOW selects a 1 Hz internal cyclic data rate which enables visual observation of the internal operation of the interface on the DISPLAY REGISTER lamps.

The LAMP TEST/RESET toggle switch selects a test of all lights on the panel, or resets the internal registers and the DISPLAY REGISTER lights to logic 0. LAMP TEST and RESET positions of the switch are spring-loaded. The OPR/TEST lights monitor the position of the MASTER CONTROL switch. The white OPR light illuminates to indicate OPERATE is selected, the white TEST light illuminates to indicate TEST is selected and both are out to indicate OFF is selected.

The GO momentary switch initiates the transmission of advanced demand pulses or frame pulses to the pulse reception circuits as selected by the MODE SELECT switch.

DATA LINK OPERATING GUIDELINES.

The following procedural guides are offered to assist the NAV/COMM operator in making the most of the propagation environment.

1. Before flight, use frequency prediction techniques to select the best frequencies for the range and locale over which communication is to take place.

2. Immediately before data linking, voice check the candidate frequencies to determine which gives best performance.

3. When transmitting secure ASW data, use UHF at the shortest line-of-sight range feasible; be sure that the frequency to be used is free of other traffic; use the ERROR CORRECT mode to achieve best performance; if conditions allow, repeat the transmission.

4. Environmental obstacles that can frustrate successful data linking are noise (including man-made interference), UHF ducting, and HF signal fading. To circumvent these obstacles, use the approach as suggested in figure 8-50.

DATA LINK OPTIMIZATION

LINE-OF-SIGHT OPERATION	
CONDITIONS	RECOMMENDATIONS
No UHF Ducting Present No Interfering Signals	Preferred: Freq – UHF Radio Mode – Not applicable Data rate – DATA FAST Error mode – *ERROR CORRECT Secondary: Freq – HF (above MUF) Radio mode – USB/LSB Data rate – DATA FAST Error mode – *ERROR CORRECT
UHF Ducting	Preferred: Change altitude of A/C so that both are above or both below the UHF duct. Secondary: Utilize HF above MUF and select USB/LSB, DATA FAST, and ERROR CORRECT modes.
Interfering Signals	Preferred: Select UHF channel that is clear of interfering signals. Secondary: Utilize HF above MUF and select USB/LSB, DATA FAST, and ERROR CORRECT modes.
*If error rate exceeds 10% – select ERROR DETECT mode.	

OVER-THE-RADIO-HORIZON OPERATION	
CONDITIONS	RECOMMENDATIONS
Minimum Fading No Interfering Signals Good S/N Ratio	Recommended: HF (below MUF) Radio mode – USB/LSB Date rate – DATA SLOW Error mode – ERROR DETECT
Poor S/N Ratio (High Noise-Weak Signal)	Preferred: Check alternate frequency for satisfactory S/N ratio. Secondary: Change mode to USB.
Severe Fading	Preferred: Check alternate HF for improved path conditions. Secondary: Change mode to USB.
Interfering Signals Present	Preferred: Select another frequency that is clear of interfering signals. Secondary No. 1: Change mode to USB. Secondary No. 2: Change modes to USB/LSB DATA FAST, and ERROR DETECT

Figure 8-50. Data Link Optimization

DATA LINK TERMS AND DEFINITIONS.

DATA NET or NET is a data link communication network composed of participating units operating on a specific frequency under the authority and control of an operational commander.

a. A PARTICIPATING UNIT (PU) is any aircraft, ship or station particpating in a data net.

b. The DATA NET CONTROL UNIT (DNCU) is a participating unit that performs the initiation and termination of a data net and controls the order of interrogation.

c. A PICKET is any participating unit except the data net control unit.

d. A DATA LINK REFERENCE POINT (DLRP) is a common geographic reference point for all participating units.

e. An ADDRESS is a two-digit octal track number from 01_8-76_8 assigned to each participating unit. The data link

system transmits in response to the receipt of an interrogation with the correct address code.

f. A TRACK NUMBER (TN) is a number from 01_8-76_8 assigned to each data net participant by the data net control unit. The DNCU assigns a block of 200_8 track numbers within the range of 0200_8-7776_8 to each PU for individual assignment to contacts.

g. LOCAL DATA are obtained by the participating units own sensors.

h. REMOTE DATA are received from other participating units of a data net.

LINK 11 is the format of message structure used to exchange tactical data between participating units of a data set.

a. A FRAME is the basic unit of data link information which consists of 30 bits of intelligence.

b. An ERROR DETECTION AND CORRECTION (EDC) field is that portion of a frame which is used to detect and correct transmission or reception errors.

NET SYNCHRONIZATION (Net Sync) is the continuous transmission preamble from the data net control unit for a period of not less than 2 minutes to enable frame alignment of receiving units.

a. The PREAMBLE is that portion of a transmission which enables the receiving unit to detect transitions from one frame to the next (frame alignment), and establishes an automatic gain control level (AGC) at the receiving unit.

ROLL CALL is a mode of data link operation in which each picket automatically, and in a prearranged sequence, reports tactical data to all other participating units of the data net in response to a roll call transmission from the data net control unit.

a. A CALL-UP is an interrogation of a participating unit by the DNCU when operating in the roll call mode.

b. A REPORT is an automatic reply transmission consisting of the guard code, start message, any number of tactical data messages, and a stop message.

c. A NET CYCLE is the periodic sequence during which all participating units transmit data.

MESSAGE is two successive data link frames of tactical data. The first frame is identified as frame A and the second as frame B.

CONTROL MESSAGE is a data link message used to signal the various control functions (address, start, picket stop and control stop).

a. An ADDRESS MESSAGE is an interrogation by the DNCU which contains bits that identify the next picket unit to report.

b. A START MESSAGE is a transmission by any participating unit to indicate the start of tactical data transmission.

c. A PICKET STOP MESSAGE is a transmission by a picket unit to indicate that all available data has been transmitted from the picket.

d. A CONTROL STOP MESSAGE is a transmission by the DNCU to indicate that all available data has been transmitted within the data net.

RADIO SILENCE is a data link mode of operation in which transmission is inhibited from the participating unit exercising the mode.

COMPOSITE AUDIO TONES are composite audio waveforms containing 15 tones plus a doppler tone.

A FLAG-BIT is a logic 1 signal generated by the DTS and placed in the serial word output to indicate the receipt of a START MESSAGE.

An INTERRUPT WORD is a 4-bit parallel word generated by communications interface No. 2 and transmitted to the digital computer with interrupt control.

00_8 Receive Control Line Sequence
01_8 Transmit Control Line Sequence
03_8 End of Receive Data
04_8 Prepare to Transmit-Picket
05_8 Prepare to Transmit-DNCU
06_8 Prepare to Receive
07_8 Prepare to Transmit-Short BC
10_8 Fault Indication-Receive
11_8 Fault Indication-Transmit
12_8 Prepare to Transmit-Long BC

a. Interrupt words 00_8 and 01_8 notify the computer program that it has failed to respond to an input data request (receive) or output data request (transmit) within 7 milliseconds.

b. Interrupt word 03_8 notifies the computer program that the data link system has received a PICKET or CONTROL STOP message.

c. Interrupt words 04_8 and 05_8 notify the computer program that the data link system has received an ADDRESS MESSAGE containing the local address (04_8), or received a PICKET STOP message (05_8).

d. Interrupt word 06$_8$ notifies the computer program that the data link system has received a START MESSAGE.

e. Interrupt words 07$_8$ and 12$_8$ notify the computer program that a short or long broadcast test sequence has been initiated by the operator.

f. Interrupt words 10$_8$ and 11$_8$ notify the computer program that the fault detection circuitry has detected a receive or transmit bit error.

DATA LINK OPERATION.

Note

Selection of either HF-1 or HF-2 in the data link mode, automatically grounds the other HF channel to prevent damage to the equipment.

a. A data net is initiated during preflight briefing or during flight by UHF or HF communications. The preflight briefing or in-flight communication assigns:

One of the participating units as the data net control unit (DNCU).

A common data link reference point (DLRP).

The track number (address) assigned to each participating unit.

The TN block limits assigned to each PU to be used for target identification.

The data link UHF or HF operating frequency and sidebands.

The data rate (FAST or SLOW).

The time for a net synchronization exercise (if required) (ZULU time).

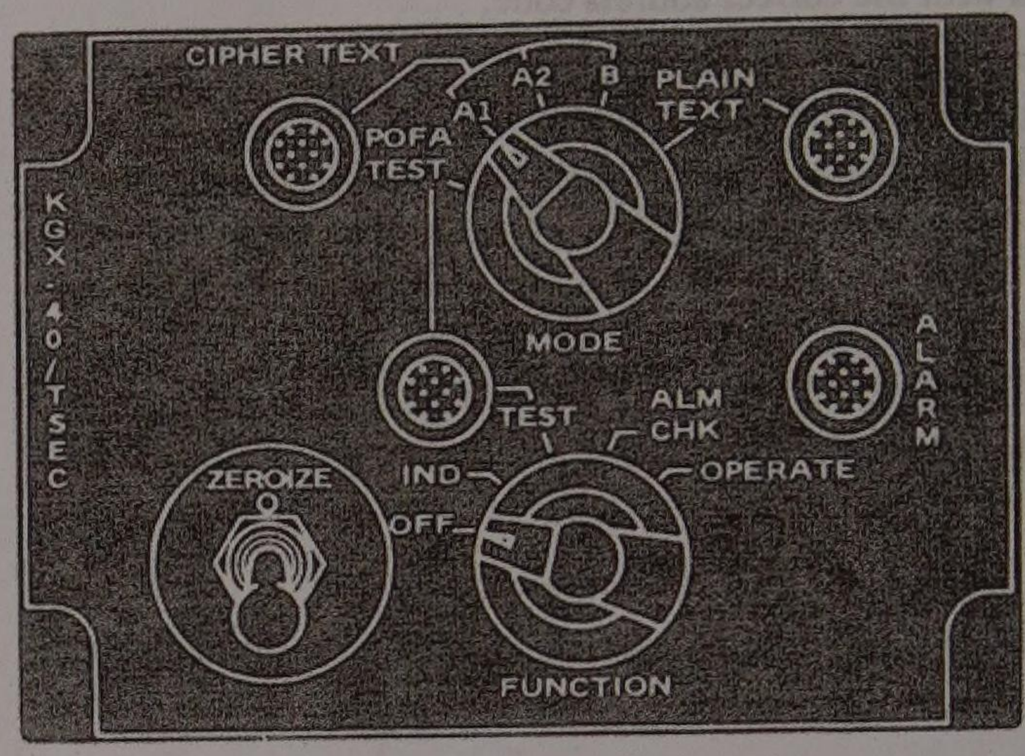
b. The data terminal set and UHF or HF transceiver operational modes and ARO data link tableau entries to the computer program are selected by the NAV/COMM operator using the information assigned above.

c. TACCO tray switch entries to the computer program are selected by the TACCO to initialize the data link program, prepare the program for tactical data exchange, and identify local data for transmission on the data net.

d. The DNCU initiates a roll call interrogation containing the address of the first picket unit to reply. The addressed picket unit data link system responds with a transmission of selected local data to all other participating units of the net.

e. The DNCU data link system then initiates an interrogation containing the address of the second picket unit to reply until the net cycle is complete.

KG-40 CONTROL PANEL



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PANEL MARKING	EQUIPMENT FUNCTION
CIPHER TEXT indicator	Indicates cipher text mode
MODE switch	Selects system mode (POFA TEST is not functional in P-3 aircraft
PLAIN TEXT indicator	Indicates plain text mode
ALARM indicator	Indicates alarm
FUNCTION switch	Selects system function
ZEROIZE switch	Zeroize system
TEST indicator	Indicates test

Figure 8-51. KG-40 Control Panel

KG-40 INITIALIZATION. (Figure 8-51.)

WARNING

Ensure that DATA LINK and COMM SYS SEL circuit breakers are pulled out on the forward electronic circuit breaker panel before installing or removing the KOK-1 permuter board or making any cable connection changes to the KG-40.

1. Meticulously ensure that the KOK-1 permuter board is properly keyed with the current code.

2. Insert the KOK-1 permuter board into the KG-40.

3. Push in the DATA LINK and COMM SYS SEL circuit breakers on the forward electronic circuit breaker panel.

4. Check to be sure that the front panel edge-lit lamps are on. Replace any defective lamps.

5. Rotate the MODE switch to a cipher text position. (Modes A1, A2, B only.)

6. Perform preflight in accordance with NAVAIR 01-75PAC-12-3.

KG-40 OPERATION.

The operating modes of the KG-40 are selected by the MODE and FUNCTION switches on the remote control panel. The alarm circuits of the KG-40 must be reset and armed at each position of the MODE switch. The ALARM indicator on the remote control panel turns on each time the position of the MODE switch is changed. To reset and arm the alarm circuits after each mode change, set the FUNCTION switch to ALM CHK then to OPERATE.

TELETYPE WRITER SET AGC-6.

NEW NEW

The teletype writer set is an integrated data communications system which provides the following functions:

1. Two-way communications between the aircraft and other stations equipped with compatible equipment.

2. Transmission of teletype messages from ASQ-114 computer storage or from the teletype keyboard.

3. Input data to the computer from the associated radio receiver on the teletype keyboard.

4. Hard copy of messages by the teleprinter from the associated radio receiver, the teletype keyboard or the computer.

5. Control, conversion processing and storage of teletype data.

TTY MODES OF OPERATION.

Five modes of operation are available and may be selected by the operator by pressing the appropriate mode key. Above each mode key is a light which illuminates when its associated mode key is pressed by the operator. When the keyboard ON-OFF switch is ON, the keyboard will automatically be in the REC mode.

The five modes and their functions are as follows:

1. XMIT key raises the keyline and holds it until a transmission sequence has been completed. Antenna coupler tuning is initiated by this key signal. If the message is also to be printed, the teleprinter CMPTR/TTY switch can be in either the CMPTR or TTY position.

2. DIR SEND mode permits the operator to send a teletype message directly via radio, bypassing the program. The message is simultaneously printed on the teleprinter which is in the TTY setting. The speed of transmission during this mode is determined by the setting of WPM SPEED control.

3. REC mode connects the radio receiving equipment to the teleprinter so that incoming messages may be printed. The keyboard is electrically disabled in this mode so that depression of keys does not result in data transmission. The WPM SPEED control must be correctly set for the speed of the incoming message. The keyboard is automatically in REC mode when power is first turned on, after a power interruption.

4. OFF-LINE LOCAL mode enables the keyboard and teleprinter to act as an electric typewriter, there is no connection with other equipment.

5. CONST & EDIT mode connects the keyboard to the digital computer so that messages may be constructed and edited prior to transmission. Constructed messages are displayed on the ARO during this mode. Eight function keys permit editing of the constructed message. These keys are: ADVANCE PAGE, CANC, LINE NO, EOM, ENTER, LINE DN, BACK, and REP.

KEYBOARD TRANSMITTER TT-568/AGC-6 CONTROLS. (Figure 8-52.)

The keyboard transmitter TT-568/AGC-6 provides five mode code special keys, eight special function keys, and the indicated complement of teletype letters, numbers, symbols and control keys required for system operation. Local controls for power and indicator light intensity are also provided. Control and indicator functions are as follows:

Note

The KW-7 – CV-1053 switch, inside the TT-568 TTY keyboard unit, provides proper input matching when input is from KW-7 or A364. The switch should always be in the KW-7 position for normal KW-7 operation.

A. XMIT selects the on-line transmit mode for the teletype system operation and enables the teletype transmitter. The light over the key is lighted. CMPTR should be selected on the HSP CMPTR/TTY switch. Any other active keyboard mode is deactivated.

B. DIR SEND enables the direct transmission of messages typed on the keyboard. If TTY is selected on the HSP CMPTR/TTY switch the typed message will also be printed on the HSP. When the direct send mode is activated the light over the key is lighted and any other active keyboard mode is deactivated.

C. REC selects the receive mode for the teletype system operation and routes received teletype messages to the computer. If TTY is selected on the HSP CMPTR/TTY switch the received message is printed on the HSP. When the REC mode is activated the light over the key is lighted and any other active keyboard mode is deactivated.

D. OFF-LINE LOCAL selects the off-line local mode for teletype system operation. Keyboard entries are printed on the HSP. TTY must be selected on the HSP CMPTR/TTY switch. When the off-line local mode is activated the light over the key is lighted and any other active keyboard mode is deactivated.

E. CONST & EDIT selects the construct and edit mode for teletype system operation. Enables the keyboard key functions to insert characters in a displayed tableau. When this mode is activated the light over the key is lighted and any other active keyboard mode is deactivated.

F. CANC clears the verification readout area of any displayed numerics, and the LINE NO. function is aborted. The keyset LINE NO. subfunction must be active. Function ignored if no line under modification.

G. LINE NO. enables the selection of a line of displayed tableau. If the index is displayed, a tableau with its title in the selected line is displayed when the line number is entered. If a modifiable tableau is displayed, the selected line is set up for modification when its number is entered.

H. EOM if the Communication tableau is under modification, the modification sequence is terminated. In each case, the EOM is stored for transmission with the tableau message. The function is ignored if the Communication tableau is not under modification.

I. RET redisplays the tableau replaced by an Error tableau. If a line was under modification, it is again set up ready for modification of its first character. If other than the first page of a multipage tableau is displayed, the return function will display the next lower numbered page. If the first or only page of other than the Index or Error tableau is displayed, the return function will display the Index tableau. If the Index is displayed the function will be ignored.

J. LINE DN enters a completely modified line and sets up the next modifiable line, if any for modification. If no modifiable line remains on the page, the LINE DN function acts as an ENTER function.

K. BACK erases the last modified character to left of the V symbol and moves the symbol back to that space. If the line is completely modified but not entered, the last modified character of the line is erased and the symbol appears there. If the symbol is at the first modified line space the function is erased.

L. REP duplicates the original line character in the space under the V symbol and moves the symbol right to the next modifiable space.

M. LIGHT INTENSITY controls keyboard illumination.

N. ENTER:

(1) Displays a tableau selected by line number from the Index tableau. Requires that Index tableau is displayed and a line number inserted into the verification readout area; activation displays the selected tableau and clears the verification readout area.

(2) Sets up a line of displayed tableau for modification. Requires that the number of a modifiable line is inserted into the verification readout area; activation sets up the selected line for modification, clears the verification readout area and terminates the LINE NO. subfunction.

(3) Enters a modified line into the displayed tableau. Requires that a line under modification has valid characters inserted in all modifiable spaces. Activation of the ENTER function enters the modified line in place of the original line and restores the line above that was cleared to provide modification space. The LINE NO. subfunction is terminated.

O. ADVAN PAGE displays next page of a displayed multipage tableau. Displayed page must have MORE in line 20. Keyboard CONST & EDIT mode must be active.

P. SPACE inserts a blank in the space under the V Symbol and moves the symbol right to the next modifiable space on ARO tableau. If the symbol is over the last modifiable space on the line a blank is inserted and the symbol removed.

Q. CAR RET. key has no current software application. Key does have application in the off-line DIR SEND and OFF-LINE LOCAL modes as a carriage return.

R. LINE FEED key has no current software application. Key does have application in the off-line DIR SEND and OFF-LINE LOCAL modes to advance to the next line.

S. LTRS selects lower case letter (character) inputs from the keyboard keys, and deactivates the FIGS function.

T. FIGS select upper case letter (character) inputs from the keyboard keys. The FIGS function is automatically activated by the LINE NO. function.

U. LOCK mechanically locks keyboard when pushed in direction of arrow.

V. Alphanumeric keys and space bar initiate generation of character or space indicated.

W. ON-OFF applies and removes primary power.

Keyboard Indicators. (Figure 8-52.)

a. POWER indicates primary power is on.

b. Hours counter (located on left side) indicates total hours power has been applied.

c. Mode lights located above each of the five mode keys. When light is illuminated, it indicates the mode of operation.

d. FIGS indicates keyboard is in FIGS configuration.

e. EOL (End of Line) is a warning indicator which illuminates after reaching 62 characters of a 72 character line.

TELEPRINTER TT-567 CONTROLS. (Figure 8-53.)

The teleprinter contains the necessary hardware and logic circuitry to process Baudot coded inputs to produce thermal print (hard copy) messages. Message data originates either in the computer or the teletype system. Control functions and indications are described as follows:

A. Bell rings on command to alert operator.

B. Pinfeed retainers hold paper against pinfeed mechanism used in loading paper.

C. WPM SPEED selects 60 or 100 words per minute.

D. INDEX advances paper one line at a time when pushed.

E. PAPER ADV advances paper continuously as long as push switch is held.

F. CMPTR/TTY selects source of printer data. In CMPTR data comes from program. In TTY data comes from radio receiver or keyboard.

G. LIGHT INTENSITY controls intensity of light on printed portion of paper.

H. Hours counter indicates total hours power has been applied.

I. POWER ON/OFF applies and removes primary power.

J. PRINT/RELEASE platen release lever is used in loading paper.

Teleprinter TT-567 Indicators. (Figure 8-53.)

a. INDEX illuminates the INDEX switch. Light remains on as long as power is on.

b. PAPER ADV is the identifying lamp for PAPER ADV switch. Light is illuminated as long as power is applied.

c. CMPTR/TTY indicating lights for CMPTR/TTY switch.

d. POWER indicates primary power is ON.

TTY SIGNAL DATA CONVERTER. (Figure 8-54.)

The signal data converter provides receive and transmit data interfacing between the teletype system and the HF/UHF communications systems (see FO-2). Control and indicator functions are as follows:

a. Meter measures power supply current output.

b. POWER SUPPLY PRESS TO ADJUST switch enables checking power supply on meter.

c. POWER SUPPLY OUTPUT ADJUST potentiometer adjusts power supply output (should be adjusted to 60 ma).

d. ELAPSED TIME indicator indicates total hours power has been applied to unit.

e. TEST SWITCH selects circuits to be measured for proper wave shapes and voltages.

f. 1575/2425 NORM/REV switch selects normal or reverse AFSK for HF transceivers.

g. 500/700 NORM/REV switch selects normal or reverse AFSK for UHF transceivers.

h. NOISE DISCRIMINATOR IN/OUT switch places HF noise discriminator circuitry in or out of TTY reception. OUT is the normal selection unless HF TTY reception is impaired.

COMMUNICATIONS INTERFACE PANEL A363. (Figure 8-55.)

The communications interface No. 1 interfaces the computer with the teletype keyboard and the teleprinter. (See FO-2.) The following listed control functions and indications for system testing are provided on the front panel.

a. TEST/OPR switch selects test or normal operate mode for the unit.

b. TEST SELECT switch is a multiposition switch for selecting outputs to be measured on test jacks.

c. WPM 60-100-3000 switch selects signal speeds when in TEST.

NAVIGATION SYSTEM.

The navigation system provides the following functions:

a. Long-range, point-to-point navigation.

b. Airways and terminal navigation.

c. Short-range tactical navigation.

d. Radar altimeter and low-altitude warning.

e. Reference data for tactical subsystems.

AGC-6 HIGH SPEED PRINTER AND TELETYPE KEYBOARD

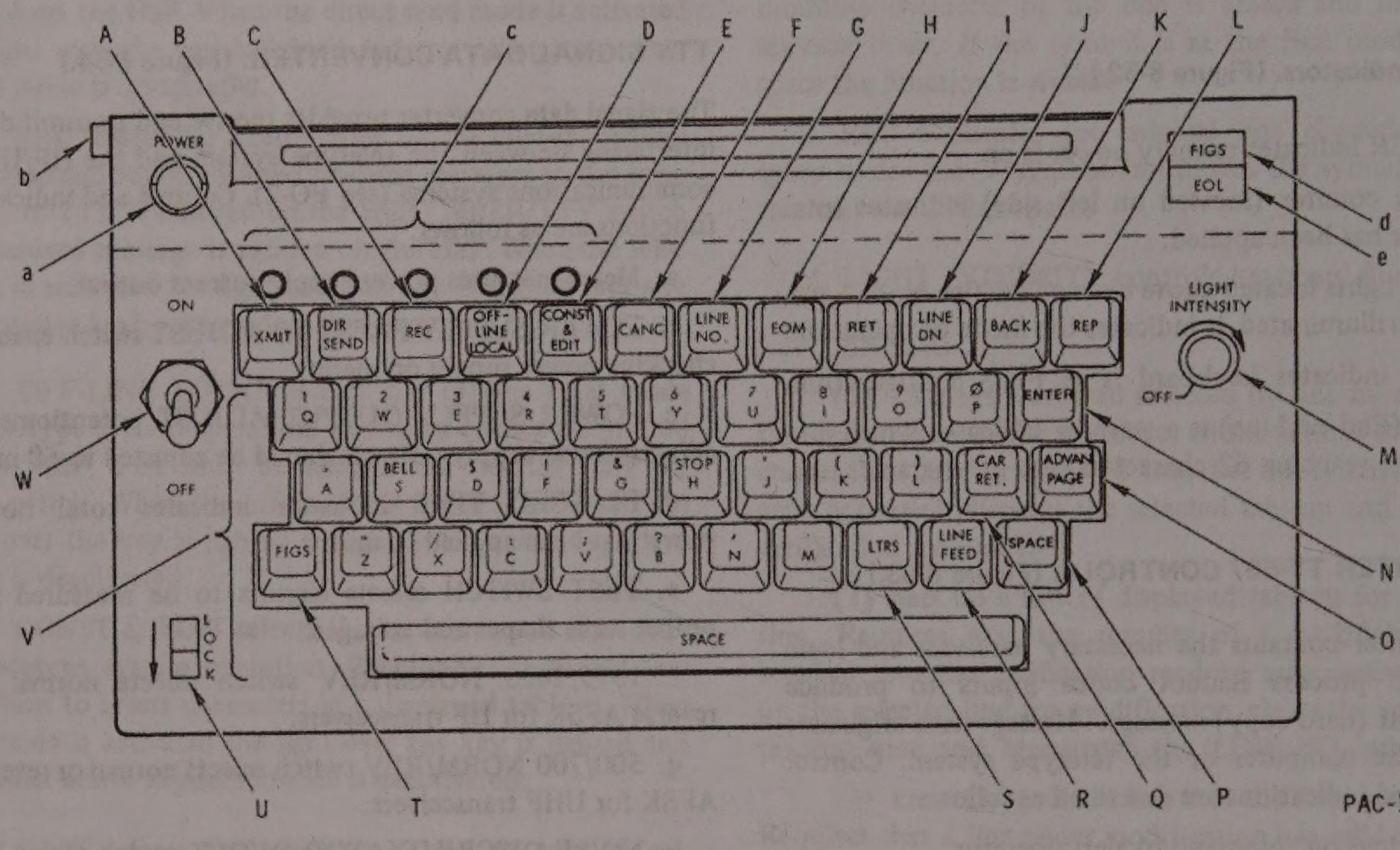

Figure 8-52. High Speed Printer and Teletype Keyboard AGC-6

TT-567 TELEPRINTER

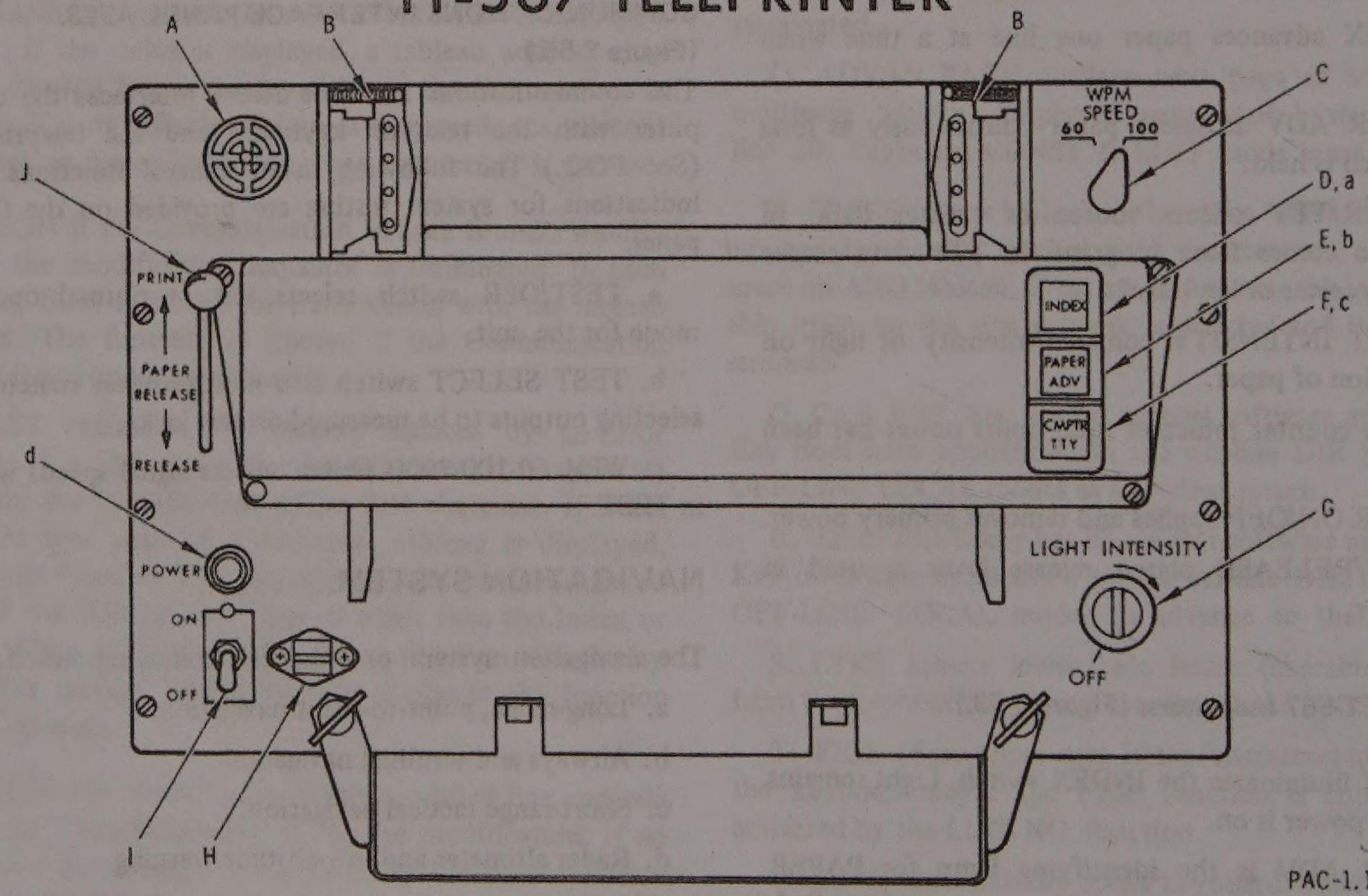

Figure 8-53. TT-567 Teleprinter

TELETYPE SIGNAL DATA CONVERTER

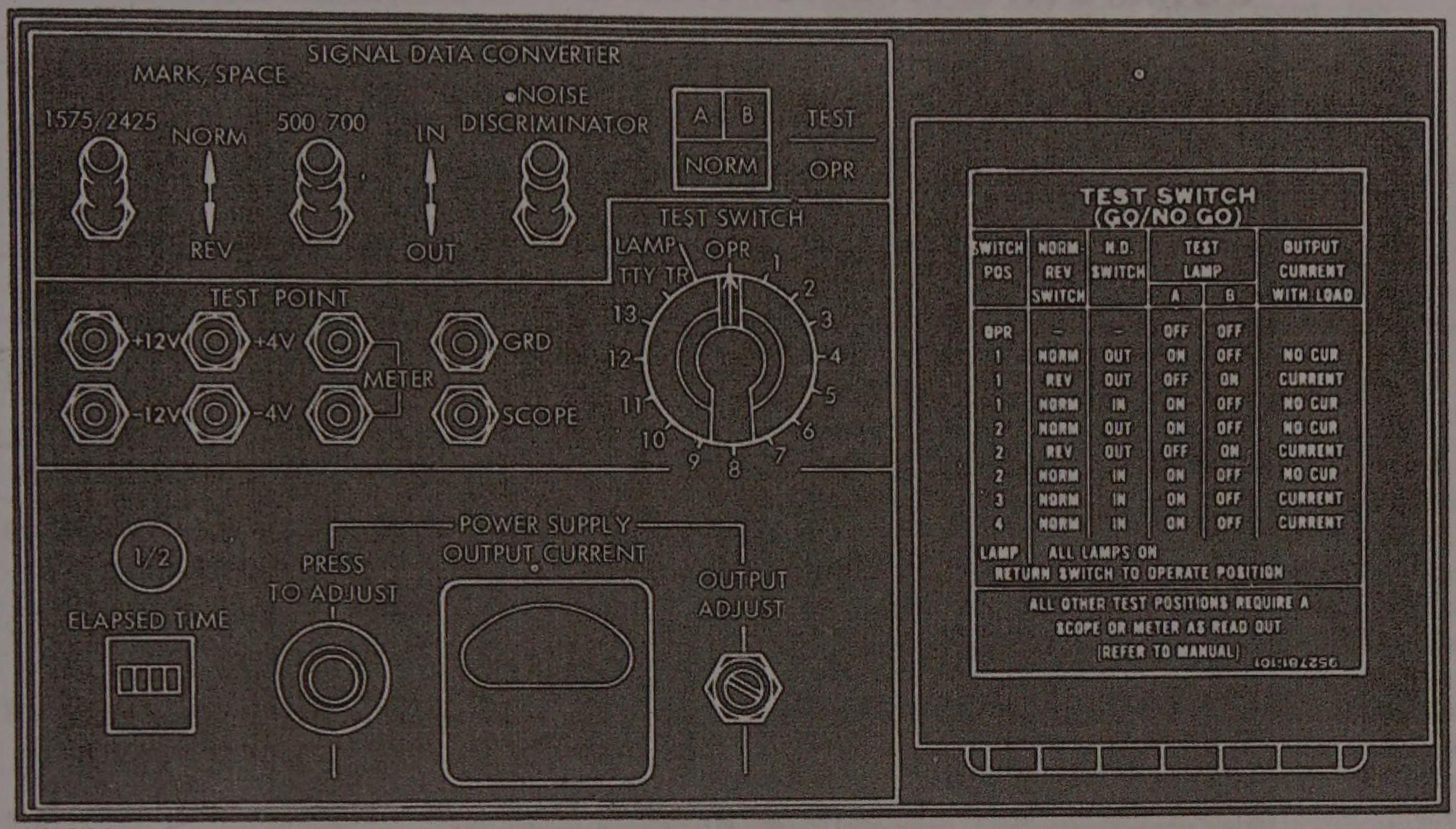

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Figure 8-54. Teletype Signal Data Converter

See figure FO-3 for a block diagram of the navigation system. In general, dual inertial systems are used to provide a predetermined course and position reference: Discrete, ancillary equipment provide specific position determination, course refinement, display data, and provide additional course guidance. Controls for the navigation system components are divided between the pilot station and the NAV/COMM station, with critical components duplicated in both stations. The navigation system consists of the following equipment.

Dual INS	ASN-84 or LTN-72
Doppler Radar or Radar Navigation Set	APN-187 or -227
True Airspeed System	A24G-9
Loran/Omega-VLF	ARN-81, or LTN-211
Omega Navigation Set	ARN-99(V)1
Tacan	ARN-52, -84(V), or -118(V)
UHF Direction Finder	ARA-50
LF Automatic Direction Finder	ARN-83
Dual VOR Receivers	ARN-87
VHF Navigation System*	VIR-31A
Flight Director System (with HSI)	AJN-15
On-Top Position Indicator	R-1651
ILS Glideslope Receiver	51V-4
Marker Beacon Receiver	ARN-32
Radar Altimeter	APN-194

INERTIAL NAVIGATION SYSTEM ASN-84.**

The purpose of the inertial navigation system (INS) is to determine the geographic position of the aircraft in flight and to provide information for guiding the aircraft to a predetermined geographic point. Additionally, the INS supplies an accurate reference from which attitude (pitch and roll) and true heading are measured. The INS develops this data from information obtained from its self-contained inertial sensors (a two-axis accelerometer and two 2-axis gyroscopes) and a digital computer. The system comprises two inertial navigation sets, identified as INS-1 and INS-2, which provide dual-source operation to increase the probability of mission success. Both INS operate independently, and are electrically and mechanically isolated from each other. Except for altitude inputs from the copilot aircraft altimeter and heading inputs from the aircraft remote compass transmitter, the INS functions without external navigational aids although it operates in conjunction with the doppler navigation radar to improve navigation accuracy and to provide the capability of in-flight alignment. Figure FO-3 shows the relationship between the INS and other aircraft navigation systems.

* Aircraft BUNO 161122, 161132 and subsequent.
** Aircraft BUNO 156507 through 161004 except 161001 not incorporating AFC 408.

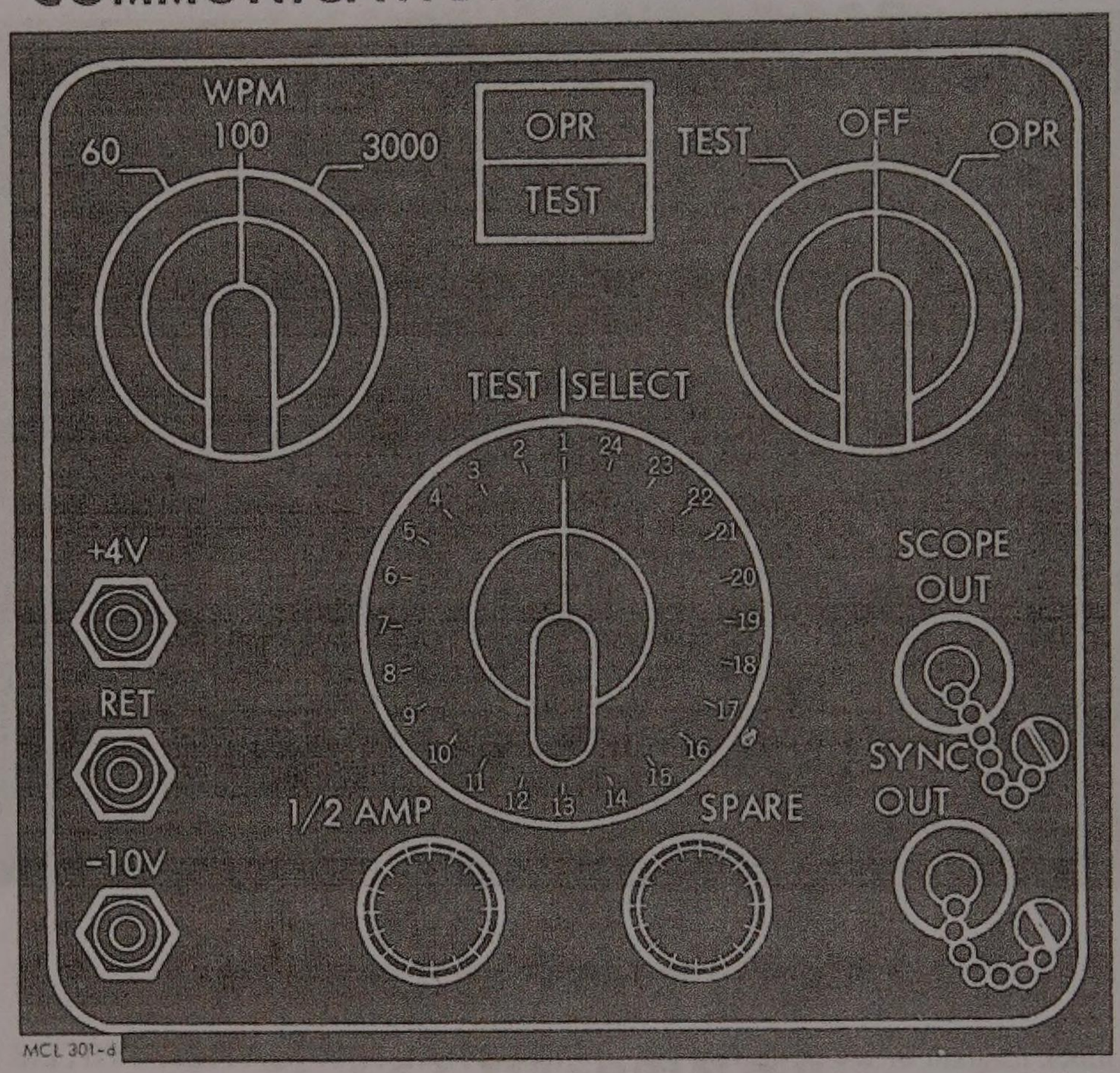


Figure 8-55. Communications Interface Panel

A two-axis accelerometer is the primary source of information for the INS. The gyroscopes exist primarily to establish and maintain a locally level frame of reference for the accelerometer while at the same time providing attitude and heading information. The wandering azimuth gyroscopes are slewed in azimuth by INS computers to maintain a locally level platform. The INS computes and displays position, velocity, heading, and attitude information to the flight crew indicators and to associated avionics equipment.

This provides the flight crew with the location of the aircraft on the globe, direction of flight with respect to geographic North, speed of the aircraft with respect to the ground, and attitude of the aircraft with respect to local level. Navigational information is visually displayed on control and indicator panels, displayed on associated aircraft instruments, and supplied to the ASW-31 (or PB-20N), central repeater system, flight director system, nav multiplexer in logic unit 2 and the SD/DS signal data converter.

CAPABILITIES AND LIMITATIONS.

INS capabilities and limitations include the characteristics listed below. General capabilities and limitations for alignment, accuracy, and drift are also included.

INERTIAL NAVIGATION SYSTEM CAPABILITIES AND LIMITATIONS

ALIGNMENT TIME
Inertial Mode (0–75 deg lat): 20 min above 0°F, 30 min below Slave Mode: 3 minutes Free Mode: 3 minutes
ACCURACY Present Position: ±2.5 nmi/flight hour

INERTIALLY DERIVED TRUE HEADING DRIFT

LATITUDE OF AIRCRAFT	PURE INERTIAL	DOPPLER/ INERTIAL
0–60 deg	0.15 (±0.015) deg T (max)	0.15 deg (max)
60–82 deg	0.2 (±0.03) deg T (max)	0.3 deg (max)
82–90 deg	0.2 (±0.03) deg T (max)	0.4 (±0.03) deg T (max)

Magnetically Derived TH Drift: 0.1 deg/flight hour (max)
Grid Heading Drift: 0.1 deg/flight hour

T = Flight Time in Hours

Note

The ASN-84 system is scaled to handle a maximum ground speed of 640 knots in any direction. If this limit is exceeded, the INS becomes unusable until speed is reduced to within limits and the system is realigned because of accumulated transport error. Symptoms of this condition are:

(1) GYRO flag on FDI in view

(2) SYSTEM FAIL light on

(3) INS position indicator LATITUDE and LONGITUDE counters reverse direction.

(4) Possible heading errors

(5) Erroneous attitude

If a velocity of 562 knots is exceeded, the GYRO flag on the flight director indicator will drop and the SYSTEM FAIL light will come on; however, other functions of the INS are not affected. By reducing aircraft ground speed below 562 knots, the flag and fail light indications can be reset by the NAV/COMM pressing the SELF TEST button on the gyro control panel. Above 640 knots ground speed, INS must be switched to slave mode to maintain valid attitude and heading data.

SYSTEM COMPONENTS.

Each INS consists of a navigation computer, position indicator, gyroscope assembly control panel, navigation control panel, a gyroscope assembly, a power supply, and an electrical equipment rack. The components are described in the following paragraphs.

Navigation Computer.

The navigation computer is a general-purpose, programmable digital computer. Except for an elapsed-time indicator, the navigation computer contains no operating controls or indicators. The navigation computer consists of card assemblies and a core memory. Connectors are provided for computer loading and for test purposes. The computer program is loaded and verified by a special test on the ASQ-114 systems test program (STP). The INS computer performs its calculations in the unipolar coordinate system then converts the output to conventional latitude/longitude. The navigation computer performs the following functions: (1) supplies N-S and E-W ground velocity information to the aircraft, (2) supplies true heading information to the aircraft, (3) supplies latitude and longitude data to the position indicator, (4) controls the operation of the gyroscope assembly, (5) performs most computation and processing of navigational data, (6) supplies all system fail signals to the operating panels, and (7) supplies all navigational information to the operating panels.

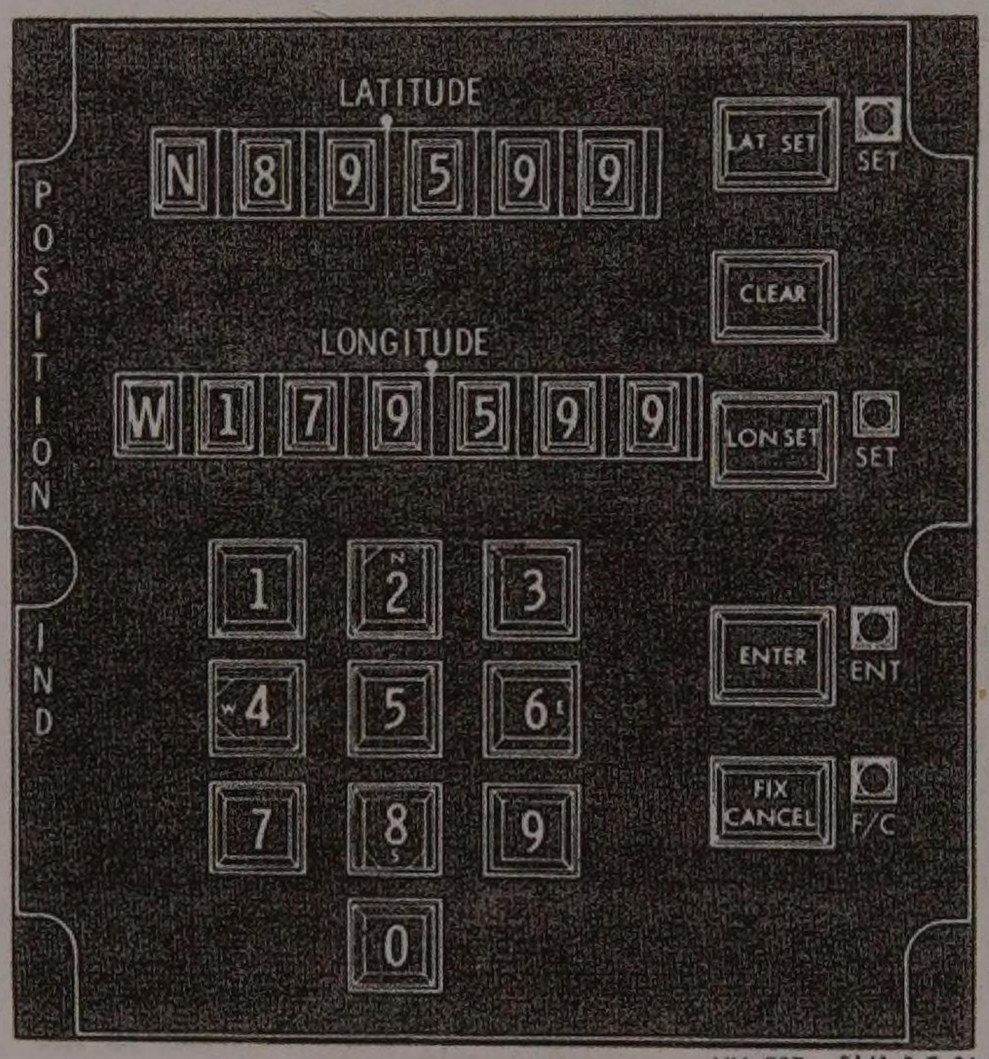
Wet Compass.

The wet compass, on the left side of the cockpit, is a fluid-based magnetic compass. Pilot tactical display must be turned off to get accurate headings on the wet compass.

Position Indicator.

Two identical INS position indicators (figure 8-56) are located on the instrument panel in the NAV/COMM station. The position indicator provides for the transfer of data between the navigator and navigation computer. The position indicator enables the navigator to control and monitor the following status. By monitoring the LATITUDE and LONGITUDE digital counters, the navigator knows the precise location of the aircraft on the earth. By means of the keyboard and associated pushbutton switches, the navigator can insert aircraft initial position into the navigation computer memory. By means of the

INS POSITION INDICATOR



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PANEL MARKING	EQUIPMENT FUNCTION
LATITUDE	*Alignment Mode:* Digital counters indicate initial latitude, N or S, degrees (2 digits), minutes (2 digits), tenths of minutes (1 digit) preset into nav computer or constant address when FIX CANCEL is pressed *Inertial Mode:* Digital counters indicates aircraft latitude, N or S, degrees (2 digits), minutes (2 digits), and tenths of minutes (1 digit). FREE/SLAVE mode – Backup latitude *Self-test Mode:* Digital counters indicate gyroscope assembly constant address when FIX CANCEL is pressed
LONGITUDE	*Alignment Mode:* Digital counters indicate aircraft longitude E or W, degrees (3 digits), minutes (2 digits), tenths of minutes preset into nav computer or actual constant when FIX CANCEL is active *Inertial Mode:* Digital counters indicate aircraft longitude E or W, degrees (3 digits), minutes (2 digits), and tenths of minutes (1 digit) *Self-Test Mode:* Digital counters indicates gyroscope assembly constants
LAT SET	Pressing pushbutton-indicator sets program LATITUDE counters to zero. SET light to right of pushbutton illuminates
SET	Indicator illuminates to indicate that adjacent LATITUDE or LONGITUDE counters have been programmed to accept new setting
CLEAR	Pushbutton pressed to clear an erroneous setting (associated SET light must be illuminated)
LON SET	Pressing pushbutton-indicator sets program LONGITUDE counters to zero. SET light to right of pushbutton illuminates
ENTER	Pushbutton-indicator pressed to enter LATITUDE and LONGITUDE numerical settings into nav computer. ENT light to right of pushbutton extinguishes when entry complete
ENT	Indicator illuminates to indicate that keyboard data has been set into LATITUDE and LONGITUDE counters. Extinguishes when ENTER pushbutton pressed to enter data into nav computer

Figure 8-56. INS Position Indicator (Sheet 1 of 2)

INS POSITION INDICATOR (Cont)

PANEL MARKING	EQUIPMENT FUNCTION
FIX CANCEL	*Inertial Mode – Nav or Damp On Submodes.* Pushbutton-indicator pressed first time to stop operation of LATITUDE and LONGITUDE counters. (INS continues to compute lat and long for navigation and begins to compute incremental lat long distances.) F/C advisory light to right of pushbutton illuminates. Position fix cycle cancelled and F/C light extinguishes when pressed a second time *Self-test Submode, Ground Align Submode, and Alignment in Slave, Free, and Compass Modes.* Pushbutton-indicator (align mode) pressed first time to stop operation of LATITUDE and LONGITUDE counters. (INS constants and data may now be inserted.) Constants insertion cycle ended when pushbutton pressed second time
1, N/2, 3, W/4, 5, 6/E, 7, 8/S, 9, 0	Keys pressed to set in values of position into LATITUDE and LONGITUDE counters. Keys inoperative unless LAT SET or LON SET pushbutton pressed

Figure 8-56. INS Position Indicator (Sheet 2 of 2)

keyboard and associated pushbutton switches, the navigator can update the position of the aircraft in flight.

Gyroscope Assembly Control Panel.

Two identical gyroscope assembly control panels (figure 8-57) are located in the NAV/COMM station. The panels are used by the navigator to control the submode of operation and monitor functions of the INS. The navigator has more system information at his disposal than the pilot and copilot, but has less overall control.

Navigation Control Panel.

Two identical navigation control panels (figure 8-58) are located in the flight station, INS-1 on the pilot side console and INS-2 on the copilot side console. The panels are used by the pilot and copilot to control the mode of operation and monitor certain functions of the INS. The controls and their functions are defined in the following list.

Note

Because of the flight-critical nature of the INS system, the flight station has primary control of the INS through the navigation control panel.

The following INS functions may be monitored or controlled by the control panel:

a. System Startup
b. Mode Selection
c. System Failure Status
d. Alignment Status
e. Grid Heading
f. Self-Test Status
g. Back-up Latitude

MODES OF OPERATION.

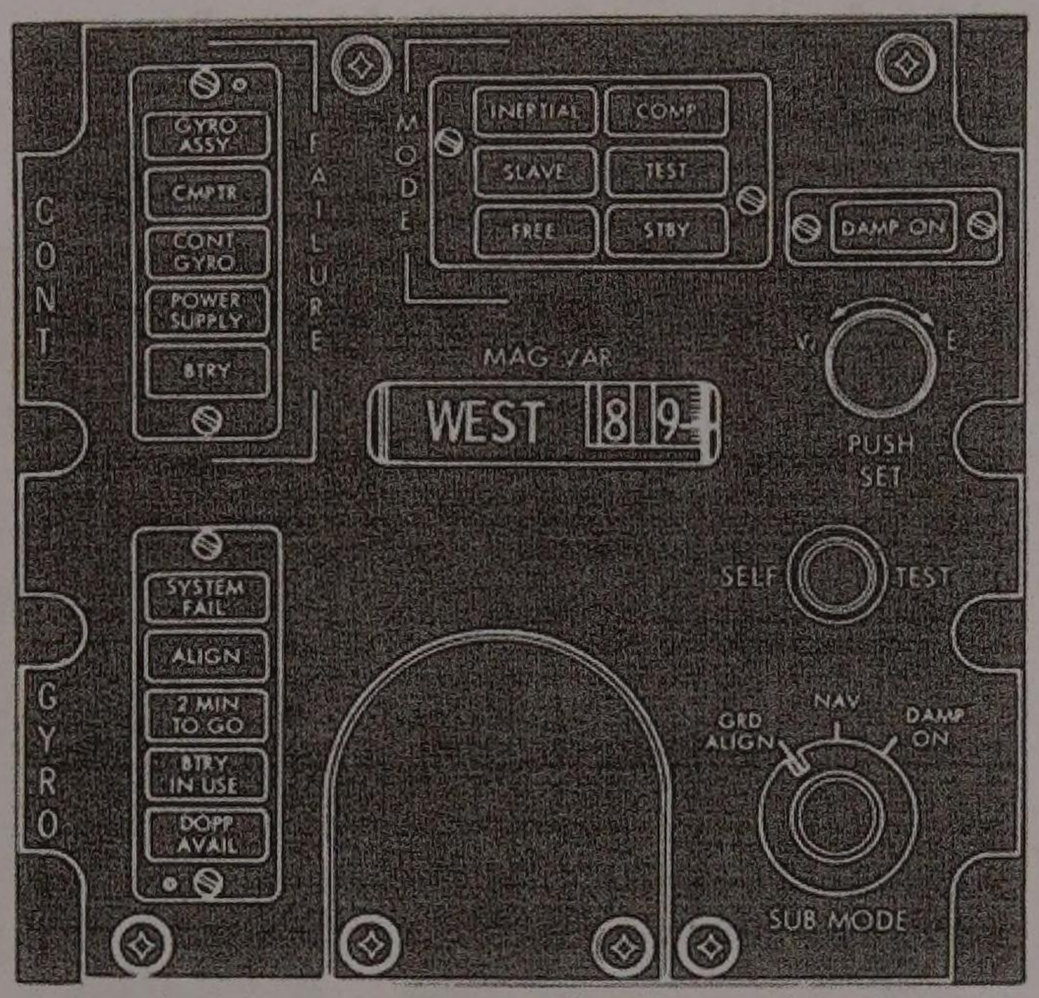
The INS is instrumented to function in several basic modes and submodes, listed and described in the following paragraphs. Figures 8-59 and 8-60 list the status of controls and indicators on the navigation control panel and gyroscope assembly control panel in each mode and submode. Changing the mode of operation (figure 8-61) affects the way in which the INS operates as a navigation instrument, resulting in a change in either the type, quantity, or accuracy of system outputs. Selection of the mode of operation is accomplished by operating the MODE switch on the navigation control panel in the flight station. Selection of a submode of operation (figure 8-62) is accomplished by the navigator using the SUB MODE and SELF-TEST pushbutton-indicators on the gyroscope control panel in the NAV/COMM station.

Standby Mode. In standby mode, no navigational information is supplied by the INS. This mode exists primarily for warmup and to provide a functional starting point to perform on-ground system self-test, and to check gyroscope bias constants.

Inertial Mode. The inertial mode is the primary mode of operation of INS. In this mode, the INS operates at its full navigational capability either as a pure Schuler-tuned or a doppler-damped inertial navigator, supplying all position, velocity, attitude, and heading outputs.

Inertial Mode/Navigate Submode. In the inertial mode, the navigation computer receives two-channel acceleration data from the gyroscope assembly and computes velocity

GYROSCOPE ASSEMBLY CONTROL PANEL



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PANEL MARKING	EQUIPMENT FUNCTION
FAILURE	
GYRO ASSY indicator	Comes on to indicate gyroscope malfunction
CMPTR indicator	Comes on to indicate a malfunction in navigation computer
CONT GYRO indicator	Comes on to indicate a control malfunction in gyro assembly
POWER SUPPLY indicator	Comes on to indicate a power supply malfunction
BTRY indicator	Comes on to indicate a self-contained battery malfunction (self-test mode only)
MODE	
INERTIAL indicator	Comes on when INS operating in inertial mode
SLAVE indicator	Comes on when INS operating in slave mode
FREE indicator	Comes on when INS operating in free gyro mode
COMP indicator	Comes on when INS operating in compass mode
TEST indicator	Comes on when self-test is in progress
MODE (Cont)	
STBY indicator	Comes on when INS is in standby mode
DAMP ON indicator	Comes on when INS operating in doppler-damped submode (inertial mode only)
PUSH SET	Knob rotated (must be pushed in to engage) to manually set magnetic variation into INS. Rotation through zero in either direction establishes east or west and numerical value on digital counters to left of knob
MAG VAR readout window	Displays digital value of magnetic variation manually inserted into INS by operating PUSH SET knob (range 180 deg E or W)
SELF TEST switch	Pressed initiates self-test in STBY mode. (Switch must be held in until TEST advisory light comes on) When switch is pressed a second time in STBY mode or in INS modes other than STBY, temporary faults are cleared
SUB MODE	(Three-position switch operable only when INS in inertial mode)
GRD ALIGN	INS in ground alignment mode. Circuits enabled to permit insertion of initial position data
NAV	INS in pure inertial mode
DAMP ON	INS in inertial mode with doppler damping
SYSTEM FAIL indicator	Illuminates to indicate a failure in the INS system
ALIGN indicator	Illuminates to indicate INS in alignment cycle. Extinguishes when alignment complete
2 MIN TO GO indicator	Illuminates to indicate 2 minutes remaining in alignment cycle. Also illuminates at beginning of standby self-test submode to indicate that INS constants can be inserted within the allotted time. Extinguishes when NAV/COMM selects an operational mode

Figure 8-57. Gyroscope Assembly Control Panel (Sheet 1 of 2)

PANEL MARKING	EQUIPMENT FUNCTION
BTRY IN USE indicator	Illuminates to indicate INS operating on power supplied by self-contained battery (maximum of 2 sec.)
DOPP AVAIL indicator	Illuminates to indicate doppler radar navigation information is available to INS

Figure 8-57. (Sheet 2 of 2)

(north-south and east-west) and aircraft present position (latitude and longitude). This computation is done in the unipolar coordinate system and then converted to conventional geographic parameters of latitude and longitude. During operation in the inertial mode, the INS navigation computer responds to commands from the nav multiplexer to supply outputs of either north-south velocity, east-west velocity, or true heading to the nav multiplexer in logic unit 2.

Inertial Mode/Damp On Submode. Whenever the navigation computer receives an inertial mode command from the navigation control, a damp on submode command from the gyroscope assembly control panel, and a doppler-available signal from the aircraft, the INS operates in the inertial/doppler-damp submode. In this submode, doppler radar velocity data, in the form of along-heading and across-heading pulse trains, are received, accumulated, converted into the unipolar coordinate system, and compared to inertial velocity data. The result is used to correct velocity, heading, and gyro-torquing commands if the converted doppler ground-speed is within $\pm$12 knots of the inertial groundspeed. This comparison is made in N-S and E-W directions. All functions described for the inertial/navigate submode are performed in this submode.

Free Mode. The INS also supplies attitude and heading outputs in the free mode, but the heading output is referenced to a grid meridian, rather than to true north. The heading can be slewed to any desired angle with respect to the meridian. This mode is used when employing grid navigation techniques, or in regions where the earth magnetic field is too unreliable for use of the slave mode.

Compass Mode. The compass mode is an emergency mode of operation, to be used when there is a failure of the gyroscope assembly or navigation computer. In this mode the INS repeats the magnetic heading data received from the remote compass transmitter. True heading is developed by combining magnetic heading with handset magnetic variation. No other navigational outputs are provided.

Slave Mode. The slave mode is primarily intended for use during flights when position and velocity information is not required, or when a navigator is not present. In this mode, the INS provides only attitude and magnetically derived heading information. Raw magnetic heading from the remote compass transmitter is gyro stabilized by the inertial platform in the gyroscope assembly control. True heading is developed by combining stabilized magnetic heading with handset magnetic variation. Normally, the INS is aligned in the inertial mode/navigate submode. In this way, the full navigational capabilities of the INS are realized. If the INS is operated in another way, some of the navigational potential is lost.

OPERATING PROCEDURES.

Inertial Mode.

To place the inertial navigation system in operation perform the following steps for each INS:

NEW NEW

CAUTION

INS circuit breakers should not be disengaged more than twice in any 30-minute period. To do so may cause damage to the INS battery.

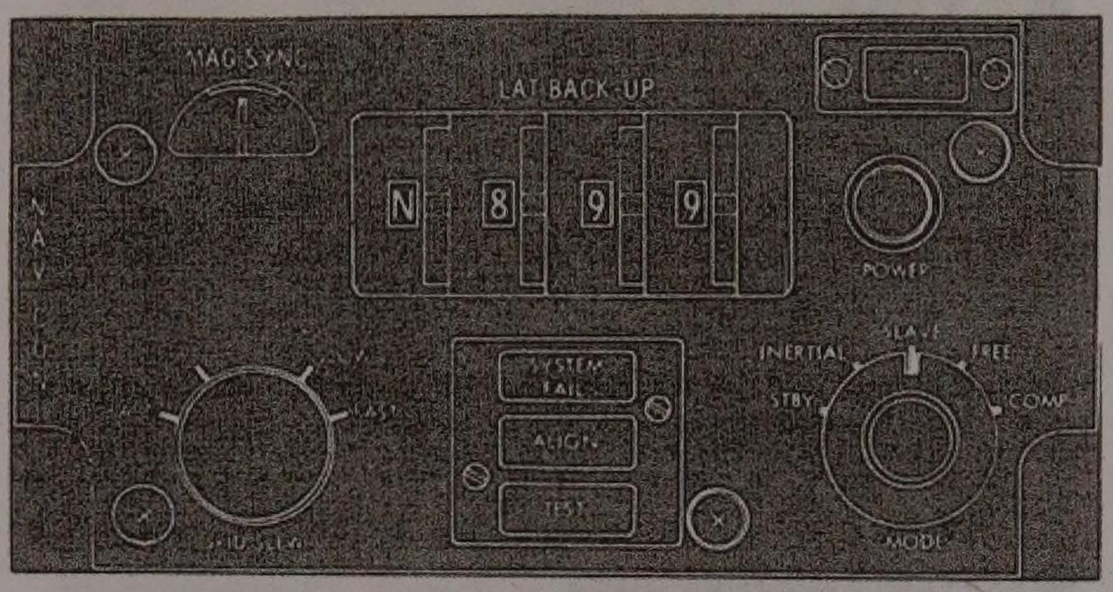
Note

- During ground alignment, the INS is making sensitive measurement of inertial parameters. Any excessive aircraft movement will have an adverse effect on INS operation.

- Once the INS is turned on, there are no provisions for turning the system off except by removing aircraft power or by disengaging the INS circuit breakers on the aft electronic circuit breaker panel.

- If the INS has been energized in an operational mode, placing the MODE switch on the navigation control panel to STBY will revert the INS system to the standby mode. The ALIGN lights on the navigation control and gyro control panels come on while the gyro cages. Only one self-test can be performed per power application in the standby mode. To initiate a second self-test, power must be removed and reapplied to the INS system.

NAVIGATION CONTROL PANEL



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PANEL MARKING	EQUIPMENT FUNCTION
MAG SYNC	When pointer centered, indicates INS magnetic heading output synchronized with aircraft remote compass transmitter output (Operative in slave mode only)
LAT BACK-UP	Thumbwheels used to manually insert latitude data into INS to correct for earth rate in slave and free modes
N, S 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 0, 1, 2, 3, 4, 5, 6, 7, 8, 9	
POWER	Momentary contact pushbutton controls INS power. Pressing pushbutton applies power to INS and illuminates ON legend on indicator above pushbutton. Switch latches in ON position

PANEL MARKING	EQUIPMENT FUNCTION
MODE	
STBY	Heater power connected and starting point provided for on-ground system self-test
INERTIAL	INS powered for full (normal) navigational capability
SLAVE	INS provides attitude and gyro stabilized magnetically derived true and magnetic heading
FREE	INS provides attitude and inertial space-referenced heading
COMP	INS provides unstablized magnetically derived true and magnetic headings
SYSTEM FAIL light	Illuminates to indicate INS failure, either in self-test or operational mode
ALIGN light	Illuminates to indicate INS in process of alignment. Remains illuminated until NAV moves SUB MODE switch on gyroscope assembly control panel out of GRD ALIGN position (inerital mode only). Light extinguishes automatically after completion of alignment in all other modes
TEST light	Illuminates when self-test in progress
GRID SLEW	
L FAST L SLOW R SLOW R FAST	With INS in free mode, movement of control knob slews all heading outputs (except clutched heading) in direction of movement

Figure 8-58. Navigation Control Panel

1. With aircraft power turned on, MODE switch on navigation control panel–STBY.

2. SUB MODE switch on gyroscope control panel–GRD ALIGN.

Note

Trickle charge is applied to INS battery any time power is applied to the aircraft and HEATER POWER circuit breakers are in.

3. POWER pushbutton on navigation control panel–Press to illuminate ON and SYSTEM FAIL annunciator lights.

4. Insert local magnetic variation, using PUSH SET control on gyroscope control panel.

5. SELF TEST pushbutton on gyroscope control panel–Press to illuminate STBY, TEST, ALIGN and 2 MIN TO GO annunciator lights on gyroscope control panel and illuminate ON, TEST, and ALIGN annunicator lights on the navigation control panel.

INS CONTROL AND INDICATOR STATUS, NAVIGATION CONTROL PANEL FUNCTIONING CONTROLS AND INDICATORS

MODE/SUBMODE OF OPERATION	CONTROLS	LIGHTS	INDICATORS
Standby	POWER switch MODE switch	ON light SYSTEM FAIL light	
Standby/Self-test	SELF TEST switch SUB MODE switch MAG VAR	ON light ALIGN light TEST light	LAT/LON
Inertial/Ground	MODE switch	ON light	LAT/LON
Align	Lat Set Lon Set MAG VAR	ALIGN light	
Inertial/In-flight	MODE switch	ON light	LAT/LON
Align	SUB MODE switch	ALIGN light	
Inertial/Navigate	SUB MODE switch	ON light	
Inertial/Doppler-damp	SUB MODE switch	ON light	
Slave	MODE switch MAG VAR LAT BACK-UP switch-indicator	ON light	MAG SYNC indicator
Free	MODE switch LAT BACK-UP switch-indicator GRID SLEW control	ON light	
Compass	MODE switch MAG VAR	ON light	MAG SYNC indicator

Figure 8-59. INS Control and Indicator Status, Navigation Control Panel Functioning Controls and Indicators

6. Within 3 minutes of starting SELF TEST, insert present position latitude and longitude using keyset on navigation position indicator.

7. Enter gyro assembly constants if required by pressing FIX CANCEL on navigation position indicator.

8. After completion of self-test, verify that the TEST and SYSTEM FAIL lights on navigation control panel and TEST, SYSTEM FAIL, and ALIGN lights on the gyroscope control panel are all extinguished.

9. Select INERTIAL operating mode on the navigation control panel and observe ON and ALIGN lights still illuminated.

10. On gyroscope control panel, observe INERTIAL and ALIGN lights are illuminated. Two minutes prior to completion of alignment the 2 MIN TO GO light illuminates. At completion of alignment the INERTIAL and 2 MIN TO GO lights remain illuminated and the ALIGN light is extinguished.

11. Select NAV on the SUB MODE switch on the gyroscope control panel to accept the alignment.

Slave Mode.

1. MAG VAR counter on gyroscope control panel—Local magnetic variation.

2. POWER pushbutton on navigation control panel—Press. ON advisory light above pushbutton illuminates.

3. LAT BACK-UP thumbwheels on navigation control panel—Set to latitude of operating base.

4. MODE selector on navigation control panel—SLAVE. SLAVE advisory light on gyroscope control panel illuminates. ALIGN advisory lights on gyroscope control and navigation control panels illuminate. Approximately 2 minutes before completion of the initial alignment sequence, the 2 MIN TO GO light on the gyroscope control panel illuminates. At completion of alignment sequence both ALIGN and 2 MIN TO GO lights on gyroscope control panel and ALIGN light on navigation control panel extinguish. The INS is now ready for takeoff. (Ground alignment in the SLAVE mode requires approximately 3 minutes to complete.)

INS CONTROL AND INDICATOR STATUS, GYROSCOPE CONTROL PANEL FUNCTIONING CONTROL AND INDICATORS

MODE/SUBMODE OF OPERATION	CONTROLS	LIGHTS	INDICATORS
Standby		STBY light	
Standby/Self-test	SELF-TEST switch	TEST light STBY light ALIGN light 2 MIN TO GO light	
Inertial/Ground Align	SUB MODE switch	INERTIAL light ALIGN light 2 MIN TO GO light	
Inertial/In-flight Align	SUB MODE switch	INERTIAL light DAMP ON light ALIGN light DOPP AVAIL light 2 MIN TO GO light	
Inertial/Navigate	SUB MODE switch	INERTIAL light	
Inertial/Doppler-damp	SUB MODE switch	INERTIAL light DAMP ON light DOPP AVAIL light	
Slave		SLAVE light	
Compass		COMP light	

Figure 8-60. INS Control and Indicator Status, Gyroscope Control Panel Functioning Controls and Indicators

The MAG SYNC indicator on the navigation control panel should be centered, indicating synchronism between the INS magnetic heading output and ML-1 magnetic azimuth detector output. During flight, the LAT BACK-UP thumbwheels should be readjusted to update aircraft latitude. If required, the INS can provide a coarse true heading output generated from inertial stabilized magnetic heading plus manually inserted magnetic variation. To provide this output, local magnetic variation should be manually inserted on the gyroscope control panel. This value should be periodically adjusted during flight to new value based upon aircraft position.

During flight, and especially during aircraft maneuvers, the MAG SYNC indicator on the navigation control panel will not be at its center position. This is because of the difference between INS-stabilized magnetic heading and unstabilized signal from ML-1 which is responsive to aircraft accelerations, turns and vibration. This is a normal situation and should not cause concern.

Note

- The position indicator is not used in the SLAVE mode; it will display, however, the LAT BACK-UP data inserted in the navigation control panel.
- If SLAVE mode is initiated in flight, the aircraft must fly straight-and-level at a constant speed until the ALIGN lights on the navigation control and gyroscope control panels extinguish.

Free Mode.

1. MAG VAR counter on gyroscope control panel–Local magnetic variation.

2. POWER pushbutton on navigation control panel–Press. ON advisory light above pushbutton illuminates.

3. LAT BACK-UP thumbwheels on navigation control panel–Set to local latitude.

4. MODE selector on navigation control panel–FREE. FREE advisory light on gyroscope control panel illuminates. ALIGN lights on gyroscope control and navigation control panels illuminate. Approximately 2 minutes before completion of alignment sequence, the 2 MIN TO GO light on the gyroscope control panel illuminates. At the completion of alignment sequence, both the ALIGN and 2 MIN TO GO lights on the gyroscope control panel and ALIGN light on the navigation control panel extinguish. (Ground alignment in the FREE mode requires 3 minutes.)

CHANGING MODES

PREV POS OF MODE SWITCH	NEW POSITION OF MODE SWITCH				
	STBY	INERTIAL	SLAVE	FREE	COMP
STBY		*INS starts alignment in inertial mode	INS starts alignment in slave mode	INS starts alignment in free mode	INS enters compass mode
INERTIAL	INS shuts down operation of gyroscope assembly		INS enters slave mode; mag heading synchronized within 120 sec	INS enters free mode	INS enters compass mode
SLAVE	INS shuts down operation of gyroscope assembly	*INS starts alignment in inertial mode		INS enters free mode	INS enters compass mode
FREE	INS shuts down operation of gyroscope assembly	*INS starts alignment in inertial mode	INS enters slave mode; magnetic heading synchro-within 120 seconds		INS enters compass mode
COMP	INS shuts down operation of gyroscope assembly	*INS starts alignment in inertial mode	INS starts alignment in slave mode	INS starts alignment in free mode	
*SUB MODE switch must be in GRD ALIGN, or DAMP ON (only if doppler available) position.					

Figure 8-61. Changing Modes

The INS grid heading output may be set to any desired reference datum by operating the GRID SLEW control on the navigation control panel and the associated cockpit-mounted heading displays. In flight, the LAT BACK-UP inserted value should be updated periodically to aircraft latitude position.

Note

- Autopilot connections to the clutched heading synchro output do not have to be decoupled during GRID SLEW as this output cannot be slewed.
- The position indicator is not used in the free mode; it will display, however, the LAT BACK-UP data inserted in the navigation control panel.

Compass Mode.

1. MAG VAR counter on gyroscope control panel–Local magnetic variation.
2. POWER pushbutton on navigation control panel–press. ON advisory light above pushbutton illuminates.
3. MODE selector on navigation control panel–COMP. COMP advisory light on gyroscope control panel illuminates.

ALIGN lights on navigation control and gyroscope control panels illuminate. Completion of alignment cycle is indicated by the extinguishing of ALIGN lights on both gyroscope control and navigation control panels. (INS reaction time in the compass mode is less than 1 minute.) A coarse true heading output, generated from INS unstabilized magnetic heading, is provided when the MAG VAR counter

CHANGING SUBMODES

PREV POS OF SUB MODE SWITCH	NEW POSITION OF SUB MODE SWITCH		
	GRD ALIGN	NAV	DAMP ON
GRD ALIGN		INS continues ground alignment process until completion, then enter pure inertial mode	
NAV	INS will not honor change		INS automatically commences doppler-damped inertial operation
DAMP ON	INS will not honor change	If switched during in-flight alignment, INS will not honor change; if switched after alignment, INS automatically commences pure inertial operation	

Figure 8-62. Changing Submodes

on the gyroscope control panel is set and updated to local magnetic variation dependent upon aircraft present position.

WARNING

Do not connect autopilot to INS clutched heading output in the compass mode, as the clutched heading servo will be inoperative. INS outputs of roll and pitch should not be used as the gyroscope assembly is not used in this mode.

IN-FLIGHT ALIGNMENT.

If the inertial navigation capability is desired and a ground alignment was either not attempted or is considered unreliable, the damp on submode should be used for in-flight alignment. The following conditions must prevail in order to complete an in-flight alignment in the INS mode:

a. Latitude is less than 75 degrees.

b. Doppler radar is available, as shown by DOPP AVAIL light illuminated on the gyroscope control panel.

c. Aircraft should be maintained in straight-and-level flight with constant airspeed. (A low altitude will help keep the doppler in the normal mode.)

Note

- The INS is designed to provide an in-flight alignment procedure lasting 20 to 30 minutes, depending on ambient temperature; however, this time is influenced by actual flight conditions during in-flight alignment.

- During in-flight alignment the INS provides, after the first few minutes of operation, outputs of roll, pitch, true heading, magnetic heading, velocity, position, and magnetic variation. Although these outputs are not as accurate as the data provided after alignment is completed, they are available for use at the crew's discretion.

- Should doppler become inoperative (or unavailable) the INS remains within the in-flight alignment sequence, awaiting doppler radar availability to continue. Should there be a period during which doppler data is unavailable while the in-flight alignment procedure is in process, a position update should be performed after doppler is again available.

In-Flight Alignment Procedures.

a. Ensure DOPP AVAIL light is lighted at gyroscope control panel.

b. Select DAMP ON at gyroscope control panel.

c. After selecting any other mode, select INERTIAL mode at navigation control panel. (If power has been lost on the INS system, select INERTIAL MODE and press POWER pushbutton at navigation control panel.)

The power ON and ALIGN lights on the navigation control panel and the INERTIAL and ALIGN lights on the gyroscope control panel are lighted.

d. Set MAG VAR within 40 seconds of initiating INS alignment.

e. Set LAT/LONG (current) within 3 minutes of initiating INS alignment.

f. DAMP ON light on gyroscope control panel comes on approximately 2 minutes into alignment.

g. 2 MIN TO GO light on gyroscope control panel comes on 2 minutes before completion of in-flight alignment sequence to advise navigator of imminent completion of alignment.

h. Upon completion of the in-flight alignment, the 2 MIN TO GO and ALIGN lights on the gyroscope control panel, and the ALIGN light on the navigation control panel go out. At this time, errors in latitude and longitude due to initial course true heading angle are automatically corrected by the INS and the INS then automatically switches to doppler-damped, inertial navigation mode. It is recommended that a position fix be performed at the completion of the in-flight alignment procedure to remove accrued position errors resulting from dead-reckoning computations.

INS NAVIGATIONAL INPUTS.

The following is a brief description of each of the navigational inputs supplied to the INS.

Magnetic Variation. Magnetic variation is a manual input, inserted into the MAG VAR counter on the gyroscope control panel by the navigator. This input is navigationally important only in the slave and compass modes, when it is used to generate a magnetically derived coarse true heading output. In the inertial mode, the magnetic variation setting provides initial positioning of the azimuth gimbal in the gyroscope assembly during gimbal caging. In the free mode, magnetic variation is not used.

Back-up Latitude. Back-up latitude is a manual input, inserted in the LAT BACK-UP indicator on the navigation control panel. In the slave and free modes, back-up latitude serves to keep the navigation computer informed of the aircraft latitude, so that the proper earth rate corrections are applied to the stable platform in the gyroscope assembly. Back-up latitude is not used in either the inertial or compass mode.

Grid Slew. Grid slew is a manual input, used in the free mode by the aircraft commander to slew the grid heading of the aircraft. Grid slew is not used in any other mode.

Magnetic Heading. Magnetic heading is an analog electrical input, received directly from the remote compass, transmitter (flux valve). Magnetic heading is used in all modes except the free mode to provide raw magnetic heading (not corrected for magnetic variation) for both initial alignment and navigational purposes.

Doppler Velocity. Doppler velocity is a pulse-train electrical input received from the doppler navigation radar. During in-flight inertial alignment, doppler velocity provides a velocity reference, without which in-flight alignment would be impossible. During operation in the inertial mode, doppler velocity refines the accuracy of the accelerometer-derived velocity by damping the long-term (Schuler) oscillations of the stable platform in the gyroscope assembly. Doppler velocity is not used in the slave, free and compass modes.

Altitude. Altitude from copilot barometric altimeter is a serial digital electrical input used in the computation of present position and gyroscope torquing rates as a correction for traveling a greater distance at high altitudes than on the surface of the earth.

Latitude and Longitude. Latitude and longitude is a manual input, inserted into the navigation computer by means of the keyboard on the position indicator at the NAV/COMM station. Latitude and longitude provides a means of inserting initial or corrected aircraft present position into the navigation computer. Latitude and longitude is used only in the inertial mode. Navigator monitors latitude in slave/free to remind pilot to update back-up latitude if necessary.

NAVIGATIONAL OUTPUTS.

The following is a brief description of the navigational outputs developed by the INS.

N-S and E-W Velocity. N-S and E-W velocity is a serial digital output signal representing the speed of the aircraft in geographic coordinates. N-S and E-W velocity is obtained by integrating the output of the two-axis accelerometer in the gyroscope assembly. N-S and E-W velocity is supplied to the nav multiplexer in logic unit 2. N-S and E-W velocity is only available in the inertial mode.

Latitude and Longitude. Latitude and longitude is a visual output representing present position of the aircraft, displayed on the position indicator. Latitude and longitude is calculated in general from acceleration and heading data. Latitude and longitude is only available in the inertial mode.

Pitch and Roll Angles. Pitch and roll angles are analog synchro output signals representing aircraft attitude with respect to local level. Pitch and roll angle signals are supplied to the SD/DS signal data converter and to the flight director system. They are available in the inertial, slave, and free modes. They are not used in the compass mode.

True Heading (Inertially Derived). Inertially derived true heading is an electrical output provided both in analog (synchro) and digital forms. It represents heading of the aircraft with respect to geographic north. Inertially derived true heading is developed in the navigation computer from information based on the position of the azimuth gimbal in the gyroscope assembly. Inertially derived true heading in a digital form is supplied to the ASQ-114 computer via the nav multiplexer in logic unit 2. Inertially derived true heading in an analog (synchro) form is supplied to the AJN-15 flight director system signal data converter. Inertially derived true heading is available only in the inertial mode.

True Heading (Magnetically Derived). Magnetically derived true heading is an analog (synchro) output representing magnetic heading plus manually entered magnetic variation. It is gyro-stabilized in the slave mode and unstabilized in the compass mode. It is not available in the inertial mode and is not used in the free mode.

Magnetic Heading. Magnetic heading is an analog (synchro) output representing the magnetic heading of the aircraft. It follows the remote compass transmitter and is supplied to the SD/DS signal data converter. It is gyro-stabilized in the inertial and slave modes, and unstabilized in the compass mode. It is not used in the free mode.

Grid Heading. Grid heading is a gyro-stabilized analog (synchro) output developed in the navigation computer from information based on the position of the azimuth gimbal in the gyroscope assembly. It is slewable to any arbitrary reference. It is used only in the free mode.

Magnetic Variation. Magnetic variation is an analog (synchro) output representing the mechanically derived differential between magnetic heading from the ML-1 and analog true heading from the inertial computer. It is computed in the gyroscope control panel and is routed to the central computer through the SD/DS signal data converter. It is only computed in the inertial mode.

Clutched Heading. Clutched heading is an analog (synchro) output representing deviation of the aircraft heading of up to 60 degrees in either direction from some arbitrary initial heading. It includes a spring return to zero when the clutch is deenergized. It is referenced to inertial true heading in the slave mode, and nonslewed grid heading in the free mode. It is not used in the compass mode. This signal is supplied to the autopilot.

SELF-TEST AND FAULT WARNING.

The INS contains built-in test circuitry which performs fault warning and isolation functions. On the ground, this instrumentation provides a self-test capability. When initiated, it checks the overall operation of the INS. If a test failure occurs, it specifies the malfunctioning component. In the air, this instrumentation provides fault-warning capability to automatically alert the flight crew of a system malfunction. Both the self-test and fault-warning features are insensitive to degraded system performance and will only respond to gross malfunctions.

INERTIAL NAVIGATION SYSTEM LTN-72.*

DESCRIPTION AND THEORY.

The LTN-72 is a self-contained, all-weather, world-wide navigation system that is independent of ground-based navigation aids. It supplies continuous, accurate, navigation and guidance data. The system also supplies an accurate reference from which attitude (pitch and roll) and true heading are determined. Airspeed information from the true airspeed (TAS) system, initial position in latitude and longitude, and magnetic heading information from the magnetic heading reference system (MHRS) are external inputs required for normal system operation. The system operates by sensing accelerations with a gyro-stabilized platform. The navigation and guidance computations are performed by a self-contained general purpose digital computer.

Two INS systems are installed in the P-3C to provide redundant operation. Each system (INS-1 and INS-2) is comprised of the following units:

1. Control display unit (CDU)
2. Mode selector unit (MSU)
3. Inertial navigation unit (INU)
4. Battery unit (BU)

In addition to the four units in each INS system, the following units are part of the dual system installation.

* Aircraft BUNO 161001 and 161005 and subsequent and prior aircraft incorporating AFC 408.

NEW

1. Magnetic heading reference system
   a. Remote compass transmitter (flux valve) (2)
   b. Compass coupler (2)
   c. Compass controller (2)
2. Air flow sensor (2)
3. Navigation power alarm panel (NAV PAC)
4. Digital data unit (DDU)

Normal system operation is dependent upon the following inputs to develop the required outputs.

1. Standby battery power
2. MSU selection
3. Aircraft power
4. CDU data
5. Navigation interconnection box synchro excitation
6. True airspeed (TAS) signal and excitation

Note

The TAS input is used to compute wind speed and direction in the INU. Reference voltage for magnetic variation is supplied by TAS. No MAG VAR output is supplied unless the TAS system is operating.

7. MHRS signal

Note

The MHRS supplies a gyro-stabilized MAG HDG signal from the compass coupler to the INU, to be used by the INU to derive MAG VAR for external systems.

In controlling and operating the system, the operator is able to:

1. Store a great circle navigation flight plan.
2. Update the flight plan prior to or during flight.
3. Display navigation and guidance data relative to the stored flight plan such as:
   a. Track angle and ground speed.
   b. Heading (true or magnetic) and drift angle.
   c. Cross-track distance and track angle error relative to the desired track.
   d. Present position.
   e. Distance and flight time to any point.
   f. Distance and flight time between any two points.
   g. Total distance and flight time remaining.
   h. Desired track.
   i. Parallel offsets from the flight plan.

Aircraft power for INS No. 1 is supplied through the RUN ϕA, HTR ϕA, MHRS NO. 1 ϕA, and DDU CH 1 DC circuit breakers. Power for INS No. 2 is supplied through the RUN ϕB, HTR ϕB, MHRS NO. 2 ϕA and DDU CH 2 DC circuit breakers. The circuit breakers are located on the aft electronics circuit breaker panel.

SYSTEM COMPONENTS.

Control Display Unit (CDU).

The control display unit (figure 8-63), located at the NAV/COMM station, is the primary access panel for controlling the inertial navigation unit (INU) functions. The CDU also controls the automatic, manual, and remote modes of operation in flight.

Mode Selector Unit (MSU).

The mode selector unit (figure 8-64), located at the pilot and copilot side consoles, is used to energize and align the system before flight. It also controls the application of power to the INS and controls the STBY (standby), ALIGN, NAV (navigation), and ATT REF (attitude reference) modes of operation.

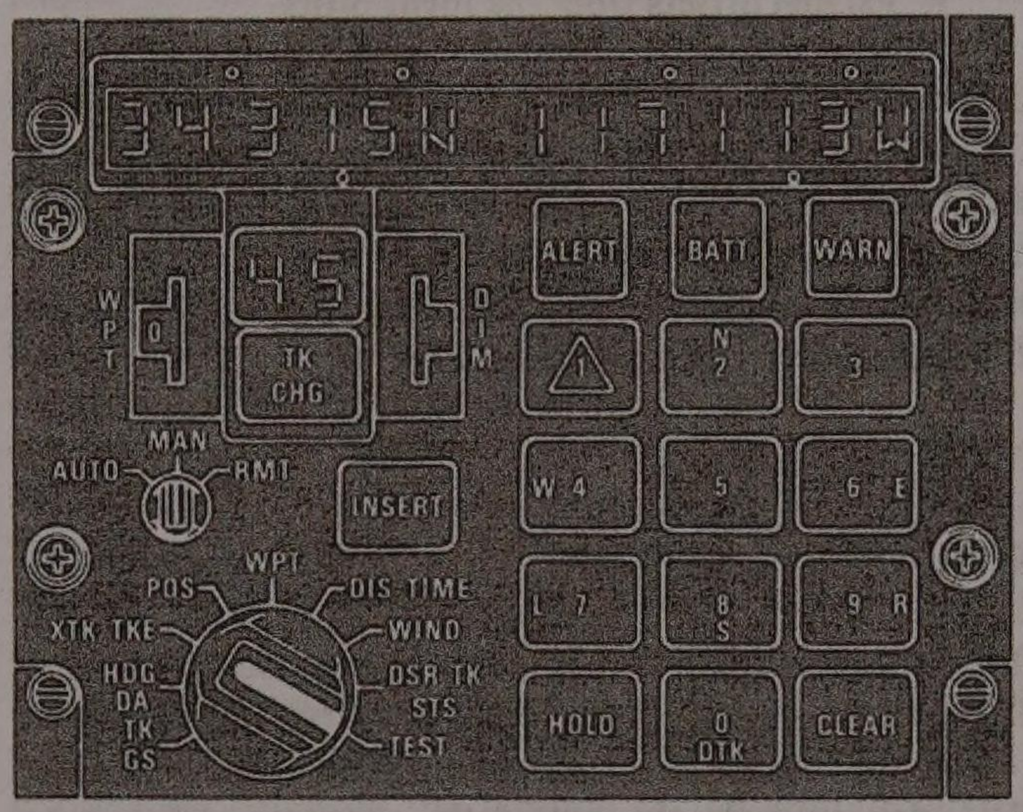
Inertial Navigation Unit (INU).

CAUTION

The cooling for the two LTN-72 INUs is controlled by a two-position butterfly valve. The normal position allows cooling by means of the cabin exhaust fan. The emergency position uses the air conditioning duct fitted with a special orifice and is only to be used in case of cabin exhaust fan failure. Ensure this valve is in the normal position at time of preflighting the aircraft. The valve is located in the lower part of rack H1/H2.

The INU houses the gyro-stabilized inertial platform, the digital computer, inertial power supply and digital subsystem modules. The platform is an all-attitude, two-degree-of-freedom, gyro-stabilized platform which uses accelerometers as its sensing elements. The basic outputs of the INU platform include pitch and roll, velocity, and azimuth. The INU power supply converts 115-volt, 400-Hz, single-phase

CONTROL DISPLAY UNIT



PAC-1(C)0219

PANEL MARKING	EQUIPMENT FUNCTION
Display switch	
TKGS (Track-Ground Speed)	Displays aircraft track angle in the left display with respect to true north, from 0 to 360 degrees, and ground speed in the right display, from 0 to 3999 nautical miles per hour
HDG DA (Heading-Drift Angle)	Displays aircraft heading in the left display from 0 to 360 degrees, and the aircraft drift angle (L or R) in the right display from 0 to 180 degrees
Display switch (Cont)	
XTK/TKE (Cross-Track Distance/ Track Angle Error)	Displays cross track distance (L or R) in the left display from 0 to 399.9 nautical miles, and the track angle error (L or R) in the right display from 0 to 180 degrees **Note** If the AUTO/MAN/RMT switch is in the RMT position, the left display shows the inserted cross-track offset distance from 0 to 400 nmi. The right display shows the track angle error and the from-to display flashes
POS (Present Position)	Display the latitude of the aircraft in the left display, and the longitude in the right display
WPT (Waypoint)	Display the latitude (left) and longitude (right) of up to nine stored waypoints corresponding to the digit on the waypoint selector
DIS/TIME (Distance/ Time)	Displays distance to go (left) from 0 to 9999 nautical miles to the waypoint currently selected, and time to go (right) from 0 to 19 hours 59.9 minutes

Figure 8-63. Control Display Unit (Sheet 1 of 3)

CONTROL DISPLAY UNIT (Cont)

PANEL MARKING	EQUIPMENT FUNCTION
Display switch (Cont)	**Note** • Time to go will read 0 at ground-speeds below 10 knots • Distance to go and time to go will read 0 until a track leg is inserted in the from-to waypoint display
WIND	Displays wind direction (left) from 0 to 360 degrees, and wind speed (right) from 0 to 999 knots **Note** Wind direction and speed will be blank until true airspeed is greater than the manually entered wind blanking value
DSR TK STS (Desired Track Status)	Displays the computed desired track angle (left) between selected waypoints from 0 to 360 degrees **Note** • Desired track reads 0 until a track leg is inserted • In RMT right display will be MAG VAR • Also used to monitor alignment progress
TEST	Used to test the CDU. All segments of the numerical and from-to displays illuminate. The ALERT, BATT, WARN, degree, decimal and minute displays illuminate, TK CHG, INSERT and HOLD pushbuttons illuminate **Note** • Test may be performed during STBY, ALIGN and NAV without affecting LTN-72 operation

PANEL MARKING	EQUIPMENT FUNCTION
TEST (Cont)	• During display test in STBY and ALIGN, HSI heading will rotate to 120 degrees if HSI COURSE is set to TAC/NAV and BEARING is set to DA
AUTO/ MAN/RMT (Auto, Manual, Remote)	Controls the method of waypoint sequencing and data entry
AUTO	Track leg changes are automatically sequenced in order by the system at the appropriate time
MAN	Track leg changes are manually initiated by the operator
RMT	Permits semiautomatic autofill operation. Data entry from one system is automatically transferred to the other systems. Remote is also used to call up DIST/TIME and DSR TK STS between waypoints other than the active track leg and to observe inserted crosstrack offsets
WPT (Waypoint)	Selects waypoint (1 thru 9) for latitude and longitude insertion or selects waypoint (0 thru 9) for presentation of waypoint coordinates
TK CHG (Track Change)	Allows manual track change to be made with the data keyboard
INSERT	Used to insert keyboard entries into the computer
From-To Display	Provides a visual indication of the from and to waypoint numbers representing the active track leg

Figure 8-63. Control Display Unit (Sheet 2 of 3)

CONTROL DISPLAY UNIT (Cont)

PANEL MARKING	EQUIPMENT FUNCTION
DIM	Dimmer control to vary intensity of from-to and numerical displays
ALERT	Signifies (amber) the aircraft is within a preset time of selected waypoint **Note** ALERT light will not illuminate when groundspeed is below 125 knots
BATT (Battery)	Indicates (amber) the primary ac power has failed and the system has reverted to the backup dc power source
WARN (Warning)	Indicates (red) the system self-test and monitoring circuits have detected a
WARN (Cont)	malfunction and that the navigation data is no longer available **Note** A flashing warning light indicates system degradation
Data pushbuttons	Used to manually enter data into the displays
CLEAR	Used to clear keyboard entries before they are inserted into the computer
HOLD	Freezes the present position, but does not stop position computations within the system. This provides for convenient position reporting and manual position updating

Figure 8-63. Control Display Unit (Sheet 3 of 3)

primary power into various regulated and unregulated dc voltages required by the system, and is capable of operating from a dc supply in the event 115-volt power is lost.

Battery Unit (BU).

The battery unit located in rack H1/H2 is a backup dc power source to the system. In the event that primary 115-Vac power is lost, the BU provides operating power to the INS for 15 minutes or until the battery discharges below a predetermined level of 17.5 Vdc.

Magnetic Heading Reference System (MHRS).

The MHRS supplies analog (synchro) outputs representing either the stabilized magnetic heading of the aircraft or the slewed DG (directional gyro) heading. The compass controller (figure 8-65) selects either the SLAVED or DG mode for the MHRS. Selecting SLAVED on the compass controller enables the compass coupler to stabilize signals supplied by the flux valve with the platform heading output from the INU. Selecting DG on the compass controller references all outputs to the platform heading which takes the place of a directional gyro signal. The output signal heading can be slewed clockwise or counterclockwise with the SET HDG spring-loaded center-off rotary switch on the compass controller.

Navigation Power Alarm (NAV PAC).

NAV PAC warnings are transmitted visually and aurally for each INS system. The NAV PAC warning lights and horn (figure 8-66) located in rack H1 indicate that damage to the INU for that system is probable since there is not sufficient air to cool the INU. The warning lights illuminate and the horn sounds if aircraft power is secured with the INS system left in any position other than OFF.

ALIGNMENT AND PRESENT POSITION ENTRY.

Alignment of the LTN-72 system is necessary before starting the engines and is accomplished using the following procedures:

1. Set the MSU mode selector switch to STBY.
2. Set CDU display switch to POS.

Note

Verify that left display is 00000 N, from-to display is 00, and right display is 72.9.

3. Press the appropriate data keyboard buttons to enter present position (latitude).

MODE SELECTOR UNIT

PAC-1(C)0220

PANEL MARKING	EQUIPMENT FUNCTION
Mode selector switch	
OFF	Turns INS power off
STBY	Inserts present position coordinates and allows display test to be performed. Power is supplied to all units. System alignment begins **Note** The system is not affected by aircraft movement while in the STBY mode.
ALIGN	Aligns the system **Note** The aircraft should not be relocated when the system is in align mode.
NAV	Normal flight operating mode **Note** • NAV mode must be selected prior to starting engines or moving aircraft. • The knob must be pulled away from the panel before the mode selector switch can be set out of the NAV position.
Mode selector switch (Cont)	
ATT REF	Attitude reference is normally selected in the event of the loss of navigation capability. In this mode, the system provides platform heading, pitch, and roll attitude signals **Note** • If the system detects a computer failure during NAV mode, it will automatically revert to the attitude reference mode. • Once deselected, NAV mode cannot be used unless a new ground alignment procedure has been completed.
READY NAV (Green)	Indicates that the system alignment is completed and the system is ready for the navigation mode of operation **Note** The READY NAV light will only illuminate if the mode switch is in ALIGN position. The light extinguishes when NAV is selected.
BATT (Red)	Provides a visual indication that the back-up dc voltage has been used, and is depleted below 17.5 Vdc **Note** INS will turn off.

Figure 8-64. Mode Selector Unit

COMPASS CONTROLLER

PAC-1(C)0221

Figure 8-65. Compass Controller

4. Press INSERT pushbutton.

5. Press the appropriate data keyboard buttons to enter present position (longitude).

6. Press INSERT pushbutton.

Note

Any errors made when entering the latitude or longitude can be corrected by pressing the CLEAR button and reloading the data.

7. Set the MSU mode selector switch to ALIGN.

Note

To monitor alignment progress, set the display selector to DSR TK STS. The align status is shown on the right display as a status number (90, 80, 70, 60, 50, 40, 10, and 02). At status 60 an automatic test of system alignment is made. If the test is passed alignment continues. If the test fails the WARN indicator flashes. Check the action code in the right display. Figure 8-67 shows the appropriate action to be taken.

8. Set the MSU mode selector switch to NAV.

Note

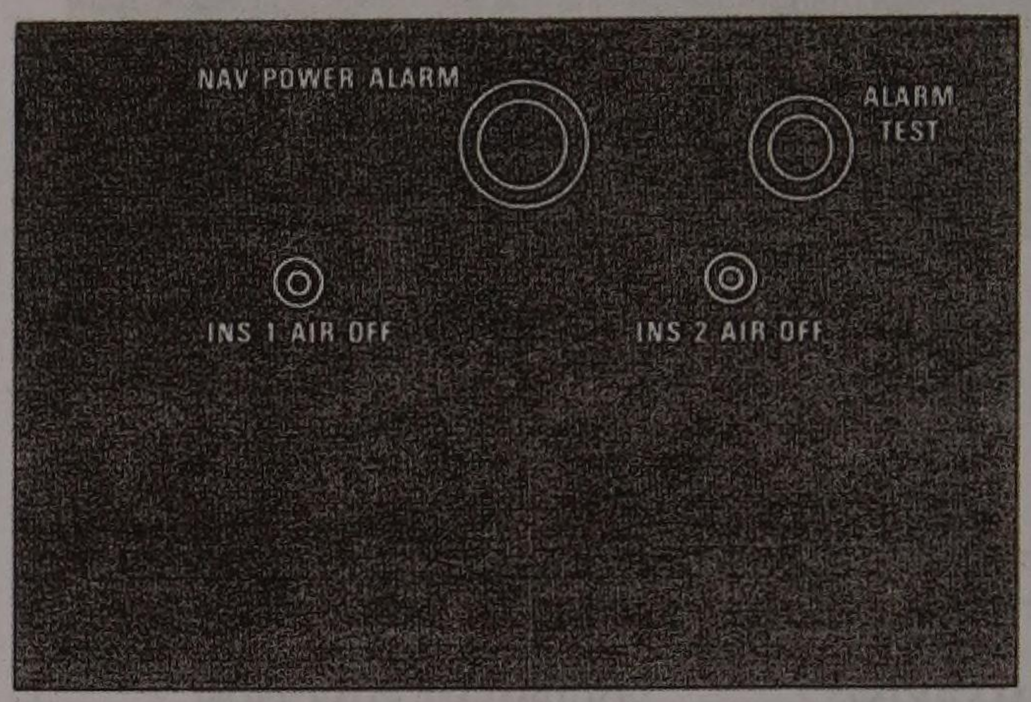
It is recommended that the switch be set to NAV just prior to engine start.

NEW NEW NEW

COLD WEATHER OPERATING PROCEDURES.

If the interior aircraft temperature (as indicated on the flight station and cabin temperature indicators) is below $0^{o}C$, the following alignment procedures are recommended:

NAV POWER ALARM



PAC-1(C)0222

Figure 8-66. NAV Power Alarm

1. Ensure the INS ac and dc circuit breakers are pulled.
2. Advance MSU from OFF to ATT REF position.
3. Reset the INS ac and dc circuit breakers.
4. Allow the LTN-72 to warm up for 15 minutes.
5. Return MSU to OFF position for 30 seconds (allowing platform instruments to spin down).
6. Resume normal NAV alignment preflight procedures.

NEW NEW NEW

TAXI SPEED and TRACK ANGLE MONITORING.

While the aircraft is taxiing, the track angle with respect to true north and the taxi speed can be monitored as follows:

1. Set display switch on CDU to TK GS.
2. Groundspeed is displayed in the right display.
3. Track angle is displayed in the left display.

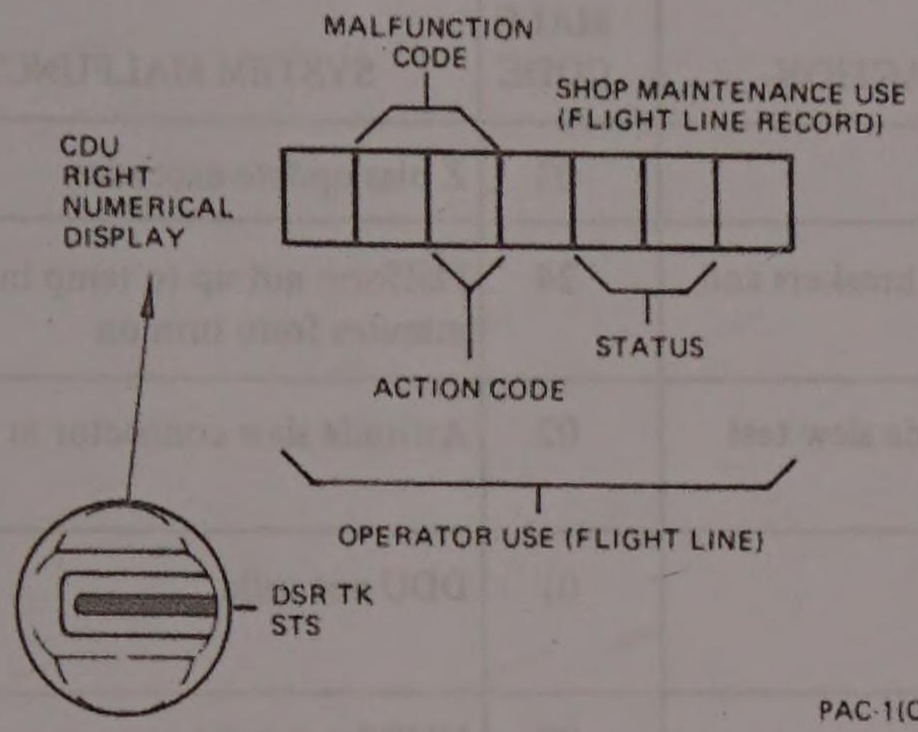
MODES OF OPERATION.

The LTN-72 is instrumented to function in several basic modes. The MSU enables selection of the operating mode. The modes are described in the following paragraphs.

Standby Mode.

Selecting STBY on the MSU enables the INU to begin alignment procedures. In STBY, the gimbals are caged, the gyros are brought up to speed, INU heaters are turned on, and platform leveling is begun. During this time it is necessary to enter present position in latitude and longitude through the CDU. When temperatures reach the desired

LTN-72 ACTION AND MALFUNCTION CODES



ACTION CODE	RECOMMENDED ACTION	MALF CODE	SYSTEM MALFUNCTION	MASTER WARN
1(a) (d)	Remove,system maintenance required	12	$\Sigma\lvert\Delta V_y\rvert$ = 0 over 5 minutes	
		13	$\Sigma\lvert\Delta V_y\rvert$ = >5.75g over 4 seconds	
		14	$\Sigma\lvert\Delta V_x\rvert$ = 0 over 5 minutes	On steady
		15	$\Sigma\lvert\Delta V_x\rvert$ = >5.75g over 4 seconds	
		16	Gyro torquer fail	
		17	Arithmetic error	
		18	GS excessive	
2 (b)	Cycle system through off on sequence reenter present position	11	Program sum check failure	
		19	Level velocity excessive	
		20	Coarse alpha fail	Flash
		21	Level axis bias update excessive	
		23	Platform not ready within 1 minute after up to temp	
3 (b)	Cycle system back to stby. Reenter present position	22	Present position not entered and MSU in ALIGN or NAV	Flash
4 (b)	Do not use INS for mag/true heading. Check all assoicated 26V 400 Hz circuit breakers and restart	04	Dig snyc Ch 4 loop test fail (drift angle)	
		05	Dig sync Ch 3 loop test fail (TK TKE – DA)	
		06	Dig sync Ch 2 loop test fail (HDG steering)	Off
		07	Dig sync Ch 1 loop test fail (TKE steering)	
		08	Dig DC loop test fail (X TK)	
		10	Loss of platform synchro excitation also blanks HDG DA and wind displays	

Figure 8-67. LTN-72 Action and Malfunction Codes (Sheet 1 of 2)

LTN-72 ACTION AND MALFUNCTION CODES (Cont)

ACTION CODE	RECOMMENDED ACTION	MALF CODE	SYSTEM MALFUNCTION	MASTER WARN
5 (c)	No action recommended	03	Z bias update excessive	Off
6 (b)	Turn off, check INS circuit breakers and restart	24	Platform not up to temp in 5 minutes from turn on	Flash
7	Check for removal of attitude slew test connector	02	Attitude slew connector in place	Flash
8 (f)	Check DDU circuit breaker	01	DDU not valid	(e) Flashes until manually cleared
8 (d)	Check MHRS circuit breaker	09	MHRS not valid	(e) Flashes until manually cleared
	Note Check that DG/SLAVED switch on compass controller is in SLAVED position. This switch in DG position causes action code 8, malfunction code 09.			
(a) Will occur in NAV mode only (b) Will occur in align mode only (c) Will occur at status 02 only		(d) Gyro flag on FDI and system invalid to autopilot (e) Complete CDU entry if in progress. Clear flashing warn by pressing clear pushbutton (f) Power or analog failure causes gyro flag on FDI and system invalid to autopilot		

Figure 8-67. LTN-72 Action and Malfunction Codes (Sheet 2 of 2)

level, the INU may be used as a directional gyro by the compass coupler and as an attitude reference by the FDS without further alignment procedures, by selecting ATT REF on the MSU.

Align Mode.

Selecting ALIGN on the MSU enables the INU to complete the alignment procedure. Upon completion of the alignment the READY NAV light illuminates.

Navigation Mode.

Selecting NAV on the MSU enables the INU to provide suitable reference data for the aircraft navigation systems. NAV must be selected prior to starting the engines or moving the aircraft.

Attitude Reference Mode.

Selecting ATTD REF on the MSU disables the navigation capability of the INU for the remainder of the flight. The INU continues to provide platform heading for use as a directional gyro to the MHRS, and pitch and roll for use as attitude references.

NORMAL OPERATING PROCEDURES.

System Initialization.

When the mode selector switch on the MSU is set to STBY and the display selector switch on the CDU is set to POS or WPT, the right numerical display on the CDU indicates the computer program number. The left display is all zeros and N, the from-to display indicates 00, and the INSERT light illuminates. When the HOLD pushbutton is pressed, a number appears in the right display, indicating the revision number of the current computer program.

Initial Track Selection.

The initial track is the direct route between the aircraft present position and the initial enroute waypoint.

The operator must select and insert the initial track leg. Subsequent track legs can be manually inserted by the operator or automatically sequenced by the INS.

The desired initial track leg is inserted as follows:

1. Set AUTO/MAN/RMT switch to AUTO or MAN.

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he U.S. Navy's front line, land-based aritime patrol aircraft, the Lockheed 3 Orion is a highly capable anti-ubmarine warfare platform. onceived as a replacement for the 2 Neptune and P-5 Marlin, the P-3 rst flew in 1961. It was loosely ased on the design of the L-188 ectra passenger aircraft.

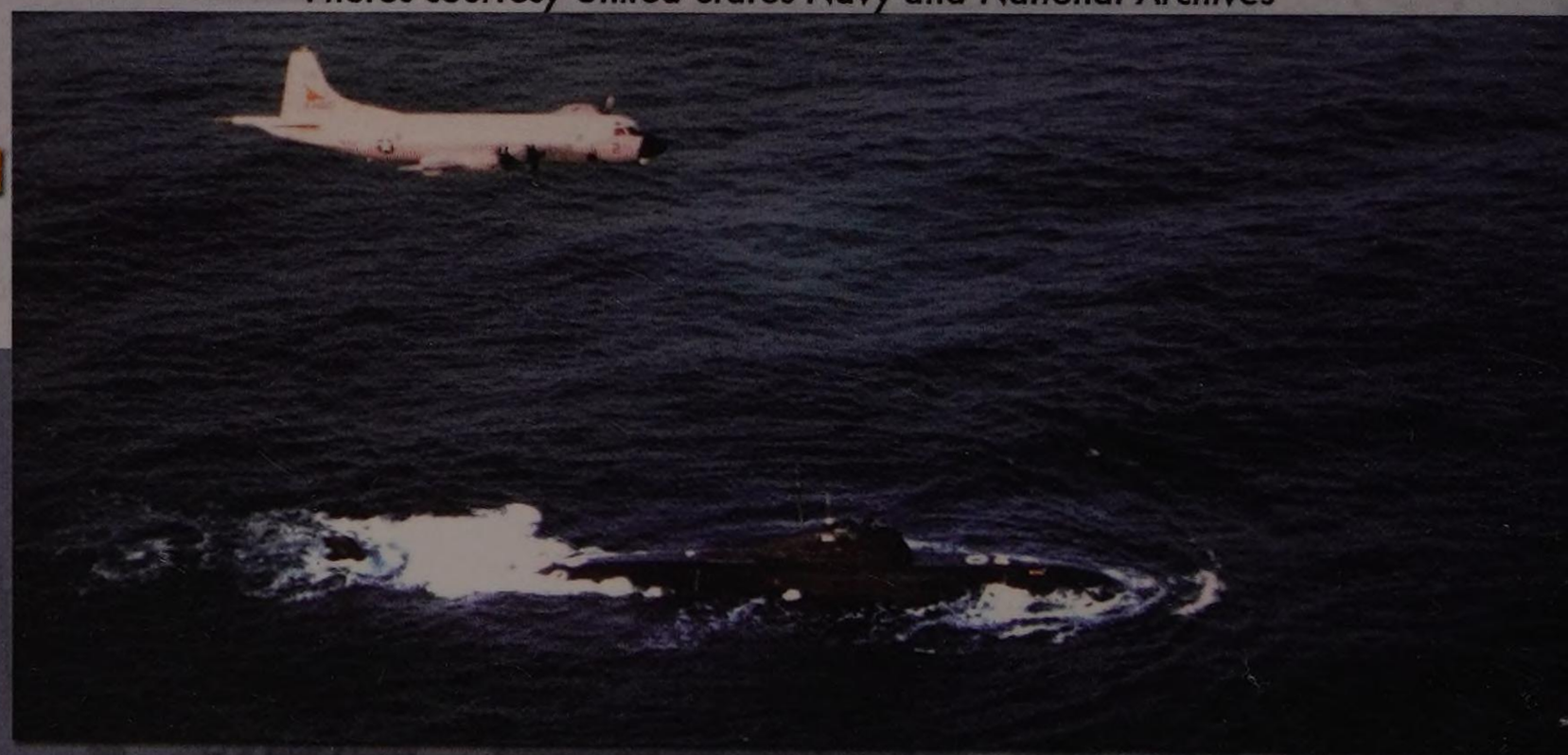
quipped with four Allison T56 turbo-rop engines, the P-3 has the speed f a fast propeller-powered fighter nd a range of nearly 2,400 nautical iles. It can remain on station at 500 feet for three hours with a nge of 1,300 nm. The aircraft ypically carries three pilots and a ew of eight. Armament capacity is p to 20,000 pounds and can include he AGM-84 Harpoon, AGM-84E SLAM, GM-84H/K and AGM-65F Maverick.

he P-3 has provided reliable service the U.S. and its allies. In addition Cold War submarine tracking, its issions have included enforcing the lockade of Cuba during the 1962 isis, coastal patrols in the Vietnam ar, and targeting of Iraqi naval lements during the Gulf War.

ver the decades the P-3 has received everal major up-dates, and more an forty variants have been eveloped. It is expected to remain service for the U.S. Navy until at ast 2013 when the P-8 Poseidon egins deployment.

is pilot's manual was originally eated by Lockheed and the U.S. avy. It has been declassified and is ere made available in book form.

Photos courtesy United States Navy and National Archives



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